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PRIVATIZATIONS IN THE WESTERN WORLD

by
ROBERT H. WESSEL

While most of the countries of the formerly Communist areas have been making structural changes to rid themselves of the heritage of government ownership and operation of productive facilities, substantial but more limited programs of economic reform have been undertaken by the nations of the Western world. These programs have emphasized policies of liberalization and privatization. Although not as dramatic as the changes in Communist areas, they have been widespread in both the geographic distribution and long run implications.

Liberalization of course refers to enhancing freedom in both resource allocation and decision making. Privatization in simple terms means the transfer of productive facilities from government to private hands. Usually both control and ownership are involved though in some instances only management is changed. In the West, privatizations have been much less radical than in the formerly Communist countries, where a restructuring of the whole society was usually attempted. Although privatizations in the breakup of Communism have largely been a phenomenon of the 1990's, in the West they have been taking place on a limited scale for decades. For example, Volkswagen was privatized in 1961, the sale of Veba A5 began in 1965 and the British Petroleum sell off was started in 1977. Some smaller firms were privatized long before.

Goals of Privatization

The objectives of privatization in Western nations have been many and diverse. In their study of this phenomenon through the public sale of shares, Meggison, Nash and Randenborgh use a simple two-fold classification

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asking only "whether the governments involved were pursuing principally political or financial objectives" (Meggison et al., 1994). This may be satisfactory for some as a first approximation. However, many essentially different motives are in fact frequently included under both "political" and "financial" so that an expanded treatment is required. The following classification of goals in a Western setting seems appropriate.

1. *Shrink the State.* – When this is the primary goal, a broad scale restructuring similar to but not as extensive as those undertaken by the formerly Communistic states is attempted. An improvement in both the macro and micro efficiency of the economy is sought. The situation they seek to correct in the Western world, however, is by no means as severe. Britain in the 1970's, for example, was far less socialized than the Soviet bock in 1990 and its economy still was largely controlled by market forces.

2. *Increase the Efficiency of Industrial Firms.* – In the simple case, firms are transferred to private hands in order to improve their operation. Most privatizations have this as one of their objectives. The process may simply involve installing new management and new techniques of operation. After the late 1970's on the other hand, when British Steel recorded the largest loss ever sustained by a U.K. company, it was finally privatized in 1988 to facilitate drastic reorganization which they hoped would staunch such losses. British Steel now is the only profitable steel maker in Europe. The new ownership enabled it to absorb the enormous human and financial cost of the transition to profitability. An 85 percent contraction of its workforce, a 220,000 job loss, and the closing of 33 of its 37 facilities were involved (Millbank, 1993).

Modern methods may have to be brought in by the new owners of a firm going private, frequently from abroad. Needed new capital may also be imported or obtained because the privatized firm has access to wider capital markets.

3. *Labor Cost Savings.* – Although the power of organized labor has been on the wane in most western countries, the public sector has been a notable exception. Because of lack of competition, public managers have been much less aggressive in collective bargaining negotiations. As a result, operating rules are often much more restrictive and wages unduly inflated. Privatization which either terminates the collective bargaining process or make it much more efficient can change this situation. This motive for privatization has been increasingly important recently in U.S. cities. It is not surprising

that unions are usually the strongest opponents of the contracting for public services by private firms.

4. *The Financial Motive.* – Many governments have undertaken privatizations because of the substantial revenue they produce. The Meggison study drawing on data from 28 countries over the 32-year period from 1961 to 1993, showed that 139 issues by 110 companies raised $222 billion. In Britain alone, proceeds from privatizations came to over $79 billion. The use of these funds has varied. In the British case, a 54 percent reduction in public debt from 124 percent of GDP in 1970 to 60 percent in 1989 resulted (Feidler, 1991). Many countries such as Argentina have relied on privatizations to help meet current operating budgets. In some cases, they also seek to get loss ridden enterprises off the public books. The exact extent of the use of privatizations for budgetary reasons cannot be accurately measured since most sell-offs produce structural as well as financial results and both types of outcomes may be among those sought. The extent to which the revenues from those sales are budgeted or otherwise incorporated into government plans leads many observers to conclude that this is possibly the primary reason why privatizations occur. South Africa's intentions to sell off public property a few months after the ANC took over surely reinforces this view.

The massive privatizations in Latin America during the early 1990's point up possible pitfalls of primarily seeking budgetary gains. In many cases, the possible proceeds from sales are overestimated by financially plagued bureaucrats. They also too often ignore the fact that a property can only be sold once and that after the sale process is complete that source of financing is gone. At best privatizations bring only short-term budgetary relief. Relying on this source of funds can prove very short-sighted as a long-range policy, especially for mature countries which have relatively easy access to capital markets. Unhappily the firms frequently selected to raise quick cash are often well operated, usually in monopoly settings, and are least in need of an ownership change. Basket cases, which need drastic reforms, rarely bring substantial prices.

5. *Political Motives in Privatizations.* – In many recent privatizations, shares have been underpriced by as much as 25 percent and as a result these issues usually are substantially oversubscribed. Obviously, buyers benefit from being allowed in the market. In more extreme cases, much larger discounts are offered usually to strategic members of the population to insure their support. For example, in Argentina in its public sale of YPF-S.A., the oil

and gas company, 13 percent of the shares were exchangeable for government bonds issued free to pensioners. Their enthusiastic backing was inevitable. In Russia, to obtain widespread public ownership, vouchers exchangeable for shares in industry were distributed at no cost to all members of the population. Free or low price shares are also often offered to employees and management groups in the privatized firms. It is important to distinguish two somewhat different motives for such acts. The policy of making important groups beneficiaries of a privatization may be intended to enlist their support for the entire privatization process. This should not be confused with merely passing out favors to build goodwill for the government or its leaders. The importance of strong public support may be critical where a series of sales are part of an overall program of structural change or efficiency enhancement. It is essential in these cases that support continue throughout the whole series of offerings. A break-down or loss of confidence when the program is only partially completed might largely frustrate the entire venture. When the sale involves only a single company such as the public offering of Nippon Telegraph and Telephone in 1987, the need for support may be limited to a few financial institutions and does not extend to the community at large.

We should emphasize before leaving the topic of motivation that two or more goals are commonly sought. In most sales in the West, only greater efficiency of operation and financial rewards have been expected. Broader political objectives are only the rule where more drastic reform is undertaken.

Techniques of Privatization

Several approaches have enjoyed wide popularity. The public sale of stock is almost mandatory when very large individual properties are sold. Nippon Telegraph and Telephone brought $15 billion, $40 billion and $20 billion in successive sales in 1987 and 1988. British Petroleum last sale was for $14 billion in 1987, British Telecommunication raised $22 billion from 1984 to 1991, and Telefonas de Mexico $2 billion in 1991. Billion dollar sales with public stock offerings were frequent with distributions of this type. When less than $100 million was involved they were somewhat unusual. The mean value of 130 such sales from 1961 through 1993 was $1.6 billion and the median $560 million.

Trade sales usually to a single or a few buyers are frequently employed, especially where price is important. In most cases there is a single

buyer, typically foreign, but in the same industry who can supply both capital and management (*Privatization Yearbook*, 1993). The sale of Banamex of Mexico in 1991 and the ill-fated sale of Aerolineas Argentinas to Iberia are examples.

Restrictions in relation to ownership may be imposed, usually limiting the percentage of shares which may be foreign held. Golden shares are sometimes issued to the government which enables it to retain a degree of control, in most cases a veto power. Some firms are restructured before they are sold to enhance their values. When the government for political reasons cannot wait for restructuring, the privatization may be accomplished using mutual funds which usually arouse less public opposition. This type of measure is not typical of Western privatizations and is almost always found in formerly Communist nations. Small firms are almost always sold to single buyers.

Who Has Privatized?

We know with reasonable accuracy which countries have launched privatizations. Although it would be impossible to list all of the individual privatizations in a short article, we have a fairly accurate picture of the properties transferred to private hands. Apart from competitive market sales, the worth of these properties is highly conjectural. Some are sold at what seems to be close to their full value, others at varying discounts and still others are given away. Since public records are by no means accurate or available, it also remains difficult to determine the total amount raised from the sales which we know have occurred or where sales have been at a discount below the total value that has changed hands. One component, the amounts obtained from the public sale of stock can be reasonably estimated, however. The Meggison study is a fertile source of information on the 139 transactions involving 110 companies. Here $222 billion was raised over the years from 1961 to 1993 (Meggison et al., 1994, p. 4). The total sums raised by private sales, both large and small, are not easily determinable and are difficult to approximate because information on both the transactions and revenues may not be in the public domain. Estimates of the total proceeds of privatization in the Western World in recent years have ranged from $126 billion to $328 billion. Unhappily, the figures are not directly comparable. Time periods differ. The $126 billion estimate was from 1988 through 1992, the $328 billion from 1985 on. Sources such as OECD, the E.I.U., Morgan Stanley and Privatization International were used in

these estimates. Other relied on many different ones. There is variation in selection of items to be included as proceeds of privatization. Opinion also differs as to which exchange rate should be used in currency valuations. Even if the estimates could be standardized for all of these variables, very large differences would remain. It is, however, likely that all estimates understate the actual amount by a substantial margin due to large gaps in all of the data.

What Has Been Privatized?

When the economies of the former Soviet world are taken private firms of all types are involved. Small retailers as well as every type of industrial giant can be included. All have been public property and are subject to transfer to private hands. In the countries of the Western World, the choice is much more limited. It should be apparent that only firms that are government owned or managed are subject to this step. This eliminates almost all retail establishments and small shops. Most small competitive manufacturing firms are also excluded for this reason. Of those privatized, telecommunication companies have produced the most revenue. Candidates are usually in the monopoly or public utility sector. Almost half of the money value has been derived from the public sale of stock issues. The largest single company ever privatized, Nippon Telegraph and Telephone, was a member of this group. Britain, the Netherlands and Denmark successfully privatized their telephone companies through stock issues. Today, around 30 telecom firms in the Asian Pacific region are listed on local stock exchanges. In Britain, water and electric companies have also accounted for a significant part of the money take. Banks which have been publicly owned are frequently privatized, particularly in France and Italy. Airlines have begun as public ventures and then put up for sale. Among the industrial group petroleum companies have most often been publicly owned and then taken private. British Petroleum is a well-known example. Steel and other basic industries have also often been nationalized in the past and are now being privatized as more countries seek to desocialize their economies (*Morgan Stanley*, 1993).

Do Privatizations Increase Efficiency?

It is obvious that privatizations usually meet the financial goal of

producing very substantial revenue. Their influence upon operating efficiency is more difficult to ascertain. In Britain where data on privatized firms and their public counterparts have been available for almost two decades, the nature of the relationship is not totally clear. Profit margins have grown and employment has declined in both privatized and publicly owned firms. This might suggest that growth and profitability have made privatizations acceptable rather than being caused by it (Bishop and Kay, 1989). On the other hand, proponents of private ownership contend that the competition of privatized firms has forced improved methods on publicly owned facilities as well. In the cases of British Coal and British Steel, the productivity gains have been very large (Vickers and Yarrow, 1991). On the other hand, water rates to British consumers have increased 67 percent since the state-owned water utility was broken up into eleven private regional water companies a few years ago. A recent World Bank study of 12 privatizations in Britain, Malaysia, Mexico and Chile, however, indicates a high incidence of success. In 11 of these cases, there were substantial productivity gains especially in countries that stress both efficiency and competition.

Privatizations often lead to substantial capital infusions into once dormant industries. In Argentina, the new owners of two newly privatized telephone companies invested almost $3 billion in new equipment. As a result, direct international dialing is now possible. Gas and electric companies there have also invested sufficient funds so that the higher demand of summer months can be met. In addition, gas supplies there in winter are now reliable (*Economist*, January 8, 1994). Argentina's experience shows that not all privatizations work out well especially those poorly planned and hastily undertaken. The sale of Aerolinas Argentinas to Spain's Iberia resulted in many complaints of poor service and continuing losses. Ultimately a partial renationalization of 30 percent of its shares took place. Since most privatizations have occurred in the last six years, a final reading on efficiency gains has yet to be taken. Most preliminary indications however, are good and individual case results are indeed promising.

Privatizations in Future Years

It is impossible to estimate with any degree of accuracy the volume of future sales of public firms. Changes in political currents make even the most well-prepared privatizations subject to delay, changes or even cancellations. The extent of this type of activity is, however, a matter of great importance

and interest. The following survey is intended to provide an overview of the extent of possible ventures in this area. It is necessarily drawn from current sources and therefore lacks the refinement of lengthy evaluation and detailed scrutiny. It does, however, provide meaningful insights as to where the process is probably going and new developments that can be expected.

*
* *

Britain. – Under the Thatcher government, Britain became both a leader and early player in the privatization game. Since 1980, over $75 billion have been raised in this way leaving relatively little property available for sale. What remains includes National Power, which has already privatized its generators, British Coal, British Rail and the Post Office.

The sale of British Coal now seems likely but its scale of operation is sure to be drastically reduced. A decade ago, it produced 90 million metric tons at its 65 mines using 191,500 workers. Now output is 60 million ton in only 49 mines with a mere 8000 workers. Some mines have reopened under new ownership. Some small private sector companies have improved operations and earned profits where large government-owned enterprises could not. They use about half as many workers as British Coal but have achieved a much higher level of productivity. Work shifts are longer and unions have backed down on many restrictive work rules. This may be a road to the future. British Coal's properties will probably be sold in pieces rather than to a single buyer (Millbank, 1994). The estimated value of all of its businesses is £700 to £800, $1.1 billion to $1.3 billion.

When parliament passed the Railways Acts, it contemplated separate sales of passenger franchises and infrastructure. This plan has been set aside because of labor difficulties. Total railroad assets are valued at £4 to £6 billion, $6 to $10 billion. Although some members of the government wanted speedy action, the complex nature of the entire process caused them to proceed cautiously with privatizing rail service (*Economist*, August 21, 1993). Public reaction to the enormous profitability of privatized public utilities has often been quite adverse. Between 1990 and 1994, profits for regional electric companies more than doubled and at some water companies, they quadrupled. Executive pay has soared. This may not be tolerated.

Some movement toward privatizing Britain's prison system is also taking place. The prison education system already has been sold. Large sums, however, are not involved in the whole venture. In summary, some movement toward privatization in Britain is still alive. The maximum proceeds though are at best $5 to $10 billion dollars. When such sums are likely to be forthcoming is very uncertain. Changing the industrial structure in the direction of private operation produced significant costs for Britain. Its share of world trade has dropped to 8 percent from 9.7 percent ten years ago. Since the end of the 1970's, 5.5. million manufacturing jobs have been lost and those unemployed have not found replacements at comparable pay.

France. – From 1986 to 1988, the conservative administration of Edmond Balladur had conducted an aggressive privatization program selling off such firms as Saint Gobain, Banque Paribas, Compagnie Générale d'Electricité, Société Générale and Compagnie Financière de Suez. Total sales came to $24 billion with public stock sales alone amounting to over $15 billion. This process ended with the election of a socialist government. Renationalization did not occur, however. The return of the Balladur group to power led to the passage of a bill in June 1993 mandating the privatization of 21 of the largest government-owned firms with a planned revenue to the state of about $68 billion. In October of that year, 60 percent of Banque Nationale de Paris was sold for $4.9 billion. Rhône-Poulenc, France's largest pharmaceutical and chemical company, which itself has invested over $8 billion in the U.S., was placed on sale in November. At that time, 43 percent of Rhône-Poulenc stock had been directly government owned with another 18 percent held by state-owned banks. The company is both profitable and efficient. It is interesting to note that officials of these companies are often anxious to be privatized primarily to obtain access to broader capital markets. In January 1994, 88.5 million shares of Elf Aquitaine were placed on the market for $6 billion dollars (*Wall Street Journal News Roundup*, January 21, 1994).

Any action with Air France seems years away. The government in 1994 invested another large sum in the carrier which still needs drastic reorganization before it can be marketed. With Renault, things were very different. The company has been profitable and well regarded. In November 1994, the government announced the successful sale of 29 percent of the shares of the auto maker. Over one million investors paid 165 francs a share, a total of 8.6 billion francs, or $1.61 billion for this stake (Truell, 1994). Further sales were expected after France's 1995 presidential elections. But in a surprise move, less than two weeks after the 29 percent block

sale, the government announced that Renault will be fully privatized in the second half of 1995. The reason seems to be the creditability of the budget which calls for 55 billion francs from privatizations. Sale of the remaining Renault stake could raise 20 billion of that total.

With Machines Bull, the situation was improving so that action on privatization became possible in early 1995. Although the large computer maker, which is 75.6 percent owned by the state, had experienced recent heavy losses, in 1995 it expected to show a small profit. As a result, in late March 1995, the French government began its privatization, pricing Bull quite moderately. As a result, Motorola is buying 10 percent and NEC of Japan, 17 percent. Assurances that Bull will not be broken up by purchasers were expected by the government. The company has been cutting both its debt and its payroll to improve operations (Lavin, 1995).

Misguided industrial policies by the state have been the cause of basic planning errors at both Bull and Air France. Even successful firms such as Elf have had loss making policies forced on them to implement French foreign policy or other government's objectives. Although professional merit has dominated most appointments, political parties of all *hues* have usually replaced managements of state-owned enterprises after elections. There are indications they intend to continue this practice after privatization, especially where state enterprises will remain large shareholders of privatization firms (*Economist*, January 22, 1993).

Pechiney SA, the French aluminum and packaging giant is a firm the government eventually hopes to privatize. The company which was nationalized by the Socialists in 1982 needs a major overhaul before that step is practical. Costs should be lowered and its debt which now exceeds equity must be reduced. In April 1995, the company announced a two-year strategy to focus on its core business. This would involve sell-offs of its component and system departments, turbine operations and its glass business. It would still retain its U.S. subsidiary, American National Can, which it acquired in 1988 and is its major source of international revenue (*Wall Street Journal*, April 12, 1995).

In general, the privatization program has been going well. By the end of 1994, France had realized almost 70 billion francs through asset sales, thus passing the pre-established goal of 55 billion. In February 1995, the government suspended all privatizations until after the election in May of that year. Had Mr. Balladur succeeded Mr. Mitterand as president, the quick privatization of steel maker Usinor-Sacilor and Assurances Générales de France could have been expected (*New York Times*, 1994). Since that did not take place, the outcome is less clear. One can only conjecture if at

some future date the fortunes of loss ridden Crédit Lyonnais will improve to the point where it too can enter into the privatization process.

Italy. – Past privatizations in Italy have been few in numbers and produced relatively little revenue. The sale of part of Società Finanziaria Telefonica in June 1992 produced $590 million, a very large sum by Italian standards. An urgent need for cash, EC demands for less political meddling in industry, plus a rapidly changing domestic situation following revelations of massive corruption at all levels of government produced plans for a sell off second only to that of France.

Italy's banks have been antiquated for years and unable to revitalize their own operations. Several privatizations and takeover attempts may be signaling a change. Credito Italiano, Italy's eighth largest bank with 122 trillion lire in assets, was privatized in December 1993. In March 1994, Banca Commerciale Italiana (BCI) also took this route and relinquished public ownership. Since then, these banks have been attempting to take over several other banks, Credito Romagnolo and Banco Ambroveneto, in particular [1]. They themselves, however, have come under the control of Enrico Cuccia of Mediobanca. At the same time, Monte dei Paschi di Siena, Italy's fourth largest bank and that city's principle source of income, was contemplating conversion into a joint stock company (*Economist*, November 5, 1994).

Mediobanca also hopes to play a leading role in the privatization of Stet (Società Finanziaria Telefonica), the state controlled telecommunications company, only part of which was privatized in 1992. It plans to pay cash and then distribute the shares to a group of core investors who are allies of Mr. Cuccia. Other interests had hoped that international investment banking channels such as Morgan Stanley or Goldman Sachs would handle the issue which could then have been actively traded on the stock market (Kline, 1995).

Alberto Clo, Minister of Industry, wants Enel, the state power utility, to be a single vertically integrated monopoly when it is privatized in July 1995. Italy's Autorità Garante, the antitrust watch dog, however, favors breaking it up so as to foster competition. The Autorità, nevertheless, can only give advice and warnings on matters pertaining to electricity. The outcome is not clear (*Economist*, April 8, 1995).

Privatization seems to be making significant progress in Italy. Obviously, important segments of the economy that only a short time ago were in

[1] In late 1994, Credito Italiano agreed to acquire 65% of Credito Romagnolo for 2.8 trillion lire ($1.73 billion) or 20,000 lire a share.

government hands are now private. The meaning of this, however, is not entirely clear. The roles of old powerful families or of individuals such as Mr. Cuccia makes the usual interpretations difficult. The existence of an interim government with Prime Minister Lamberto Dini makes explanations even more hazardous.

The future of the entire privatization plan also is still somewhat in doubt because of the exceedingly unstable political climate the corruption scandal has created. However, the financial needs of government are enormous which almost dictates further privatization. In addition to creating new jobs, further deregulation of the private sector must also occur. If the privatization program announced almost two years ago is completed as planned, some $60 billion or more could be realized. It would be a mistake to leave this topic without mentioning the widespread zeal that privatization and free markets have aroused on the part of the Italian public and the resulting pressure on political groups.

Germany. – When East Germany merged with the West an agency, Treuhandanstalt, was established to privatize state-owned enterprises. Its purpose, unlike most other privatization agencies in Western Europe, was not to produce revenue for government but to rehabilitate the East German economy. Treuhand sales will probably in total generate losses of over DM 270 billion ($150 billion). Although these losses were vastly larger than expected, Treuhand did accomplish its primary objectives. It sold off all but 100 of the 12370 businesses on its books in 1990 and left an East German economy that grew 9 percent in 1994. The human costs were high, however, with six million of the ten million jobs in these industries being eliminated. Of the few companies still on the books, most will probably be liquidated (Kaminsky, 1993). One of the last Eastern German firms to be sold will be Deutsche Waggonbau A.G., a railroad with about 6000 employees. Advent International Corporation, a U.S. firm, has expressed interest. Since West Germany like the U.S. has largely relied on private enterprises, fewer opportunities for privatization have presented themselves outside of East Germany. Now, however, a new examination of the public utility field is taking place. An accord reached in January 1994 will allow the selling off of part of the shares of Deutsche Bundespost Telekom beginning in early 1996. This could open voice service in Germany to competitive markets. But Telekom has been offering very generous benefits to employees. Competitive exposure could end all this. As a result, a substantial interest exists in continuing its protected status. Its value in privatization would also be enhanced (Hudson, 1994). The part of the company

providing postal service and telephone-line networking would remain public. The management has been pushing for privatization as a way to access capital markets as well as to modernize and improve service. Government may keep a share to influence important decisions. This company has been valued at from $45 to $64 billion and could bring as much as $65 billion in sales over five years. It is not surprising that they have brought together three leading investment bankers, including Goldman Sachs, to handle the distribution.

A large number of enterprises which could be operated by private companies are still run by the state. This stems largely from a reluctance of local governments to give up their influence or the right to name important executives. In late 1994, an effort to facilitate privatization was blocked by the Bundesrat. The federal government has a much better record reducing its holdings from 968 firms in 1982 to under 400 in 1995. It recently sold part of Leythania and plans to complete the sale in 1995. The German monopolies commission estimates that over DM 100 billion could be raised by privatization on a large scale (*Viewpoint*, December 1994).

Treuhand has invested over $300 million in EKO Stahl Gmbh and guaranteed another $100 million in loans to cover losses. It has also offered Cockerill Sambe S.A. $610 million in subsidies on condition it upgrades the plant and keeps 2,000 of the original 12,000 jobs. As a result, it has lured private investors into the troubled region and given a last chance to many industries. This is very expensive privatization but it may be paying off (Gumbel, 1994).

Sweden. – This country in late 1980 undertook a program of a relative magnitude rivaling Margaret Thatcher's. Sales of steel mills, mines, energy and forestry companies privatized firms with 300,000 employees and sales of $40 billion in private assets. Involved too were the beginnings of the marketing of Procordia, the drug giant. A partial sale of this company brought in $3.8 billion in 1989. Completion of the sale of Procordia as well as several other projects now underway could produce over $10 billion by 1998. In the summer of 1994, Sweden was successful in selling a large stake in Pharmacia, the drug maker. Institutional investors eagerly bought 24.5 million Class A shares while households purchased 47.5 million shares at a discount (Moore, 1994).

Spain. – Spain has sold off part of Argentaria a large bank, and plans to market Endera, the electric utility; Telefonica, the telecom utility; and oil company, Repsol. This could total over $8 billion. The pace of privatization

has been retarded by the Socialist government which is still in place. A conservative victory in the 1993 elections would have accelerated the process.

Latin America. – This area produced 35 percent of the privatizations worldwide in 1992. It did so in a desperate search for funds. In addition, privatizations were successful before the recent problems in luring back much of the foreign and local capital that had gone overseas. Mexico also engaged in a $20 billion property sell-off between 1988 and 1992 which contributed to this return of funds before the financial crisis. Other countries also have active programs. Argentina's YPF, only two years after its own privatization, hopes to be a front line bidder at oil and gas privatizations in Bolivia and Peru. Peru expects to raise over $9 billion over the next few years in this way. Its dominant cement maker, Cementos Lima S.A. is prepared to invest in a hydroelectric plant soon to be privatized (Moffett, 1995). Brazil, though it started late, has thus far raised over $7 billion in cash and has been relieved of $3 billion of debt from the sale of state assets. It planned to sell 32 more companies in the first phase of a new privatization program beginning in 1994. Thereafter, it anticipates another $20 billion from the sale of mining interests, as well as telephone and petroleum companies, making the grand total some $40 billion. Most of these funds are needed for domestic investments. Before all of these are realized, constitutional barriers to the sale of many properties must be removed. Privatization hopes in Brazil took a step backward when President Fernando Henrique Cardoso failed to act on Telebras, the telephone company (Ellison, 1995).

Even Bolivia is getting into the act. They expect $2 billion to be provided from this source for much needed capital investment. First to be sold is Entel, the state-owned phone company, followed by electric utility, Ende. Railroads oil companies, airlines, smelting facilities and prefectural hotels will follow. Bolivia, avoiding the term privatization, will "capitalize" six strategic companies by giving control to private investors on the condition that they invest a predetermined amount in each company (Hendir, 1993).

Columbia plans to privatize long distance telephone service, three banks, eight electric plants and other state-owned properties by 1999. They expect to raise at least $3.5 billion in this way, according to Finance Minister Guillermo Perry.

Privatizing Social Insurance

Chile had privatized most of its publicly held firms a year ago. Like many other countries with social security systems and declining birthrates, Chile faced the problem of fewer and fewer contributors supporting a growing group of retirees. Its answer was to privatize the social insurance system. This also helped reduce a national budget where one-fifth of the funds were allocated to pension and health insurance costs. The operation of the systems is unique. Here 10 percent of the worker's pay goes to a private fund of the workers choosing which then invests in a portfolio of securities. Over the first decade of operation, these funds have averaged 14 percent on the workers' investments, a return which encourages even broader participation. The government oversees but cannot appropriate these funds and guarantees a minimum pension should returns from a fund fall below subsistence levels. The real extent of this obligation will not be known until large numbers of employees reach retirement age a generation or so in the future. The total amount in these funds now amounts to $19.22 billion or about 35 percent of Chile's GDP.

By 1994 Mexico, Peru, Colombia and Argentina had adopted forms of this privatized system. Colombia, however, has compromised by retaining one fund in government hands, as an example to private funds in the control of costs (Moffet, 1994).

The success of this approach depends upon whether the returns the funds can generate over the years are high enough so that both state budgets and pensions income will benefit. If not, a liability will fall upon the government, but possibly no more than under Western governments social insurance systems. Although not totally applicable to large nations, this approach might be advantageously used with part of their social insurance funds.

Argentina has long been pursuing privatization as a source of financing. On September 1, 1994, it announced its total conversion to this approach by stating its intention to sell off *all* state-owned and operated enterprises. They will begin with three nuclear power plants. Its largest petrochemical group will be next followed by the postal service and the nation's principal airports (Hamilton, 1994).

The United States

Very little public ownership of industry has existed in the United

States. Public operation has largely been confined to local service industries and infrastructure firms where at least reasonable public satisfaction has been encountered with the service rendered. Only one national privatization, Conrail, has taken place. There the entity created out of six failed railroads was taken private eleven years later. Government takeovers have occurred largely because private operators have been unable to supply the service or product at acceptable prices. No wide support has ever been registered for socialist projects either at the local or national level. Obviously, no Communist regimes have been established. The few occasions where socialist candidates have achieved some success (Burlington, Vermont, is a case in point) have not resulted in widespread public ownership. As a result, no significant privatization movement sprung up for a long time since public operation was so limited. It is, therefore, not surprising that the public sector in many areas became bloated and inefficient after years of public complacency, especially when compared to some nations with active privatization programs. Interest was aroused as the result of a public reawakening to the possibility of substantial savings along with the aggressive posturing of public employee unions. Although organized labor has not done well recently in most sectors of the American economy, in public employment it has been enjoying increased membership and recognition along with less than vigorous resistance in collective bargaining by local officials. This has often led to inflated pay scales and efficiency inhibiting work rules. A growing interest in privatization has sprung up, especially in communities with significant budget difficulties. In addition, in April 1992, the Bush administration took steps to permit local governments to realize important economies from privatization (*Reason Foundation*, 1993).

In the United States, it is unlikely that any of the few massive publicly-owned facilities will be sold to private owners. Consequently, the vast revenues such sales might produce will not be a temptation to government. Privatization in the U.S. has usually meant contracting with the private sector to deliver services historically provided directly by government. Private operation has been expected to bring improved management of more motivated employees. Great success has been achieved in solid waste collection and disposal. The privatized industries' output here could total $30 billion in value in a few years. Waterworks operation and management on a private basis could also approach that figure. Frequently, the gain from private operation can be realized by contracting for only a part of the needed services and allowing competition between the public and private providers to generate the efficiency advances. In Indianapolis where only a small section of the city street maintenance was privatized, the competitive

process did the rest. Newark now spends $1 in contract services for every $2 in house. Street sweeping proved a case where outstanding results were realized through competition. This was also true in Boston (Sharp, 1992). Sussex, New Jersey, has had success with security guards used in this way. Portland, Oregon; Tacoma, Washington; and Baltimore, Maryland, have similar public and private programs in the same area.

In October 1993, Rodney E. Slater proposed that private businesses operate part of the interstate highway system and charge tolls for its uses. Only in this way did he feel that funds could be raised to repair decaying highways and bridges (Tolchin, 1993). When he became mayor of New York, Rudolph Giuliani indicated that he would seek to improve services and shrink government through privatization. The initial move is expected to be the transfer of at least three of the city's 11 municipal hospitals to private nonprofit corporations. Mayor Giuliani also sought bids on the Offtrack Betting Corporation which he calls "the only bookie in New York who loses money". Proposals are being considered to privatize the city's Emergency Medical Service, the bus service, garbage collection and the water supply system. A $16 billion saving over the next ten years can, according to some experts, be expected from this source. Giuliani's predecessor, David D. Dinkins, had taken some small steps in this direction by having contractors manage centers for the elderly as well as boiler inspections. Giuliani can, however, expect strong opposition from municipal unions whose members stand to lose jobs in the process (Myers, 1994).

Many other cities including Los Angeles, Chicago, whose mayor calls for privatizing the schools, and Philadelphia, are considering similar steps. How far this movement will go is at this point conjectural. To an extent, this will depend on the outcome of the battle between the municipalities and their employee unions. The saving, however, might be measured in the hundreds of billions of dollars (*Reason Foundation*, 1993).

Conclusion

We must remember that all these projections are tempered by the mood of the times. Recently public ownership and operation have been in great disfavor while privatizations have enjoyed widespread support. Even some so-called socialist parties in countries such as France now partially endorse this approach. The Reason Foundation's head, Robert Poole, has urged the sale of all types of publicly owned properties from bridges to the TVA. It is indeed possible that under these conditions privatizations will be

overdone or inappropriately applied and that much of the current enthusiasm will dissipate. This is especially true since privatizations are being suggested and in some cases undertaken in areas where they have the least to contribute. While hard evidence suggests that success is most likely where private ownership and operation are employed in vigorously competitive markets, many of the new ventures are in the monopoly or public utility field. True, better methods, improved technology and new capital infusions as well as pay scales related to productivity may produce successes even in these areas. The chance of failure, however, here is inevitably greater. Another danger arises when governments are unwilling to give up control of partially privatized firms. For example, Belgium's enterprise minister has asserted that "the state will always have the final say at Belgacom", that country's telephone company. As a result of this type of interference, either much needed reforms do not take place or are delayed excessively.

We must also remember that all too frequently privatizations are undertaken as a quick source of badly needed public funds. Those which are hastily conceived and inadequately planned have a significant chance of failure.

Very few privatizations, however successful, are totally free of adverse consequences. Many leave substantial unemployment in their wake. Britain, it will be remembered, lost 5.5 million manufacturing jobs as a consequence of its program. Under these circumstances, governments should consider investing part of the proceeds of privatization in job retraining to improve the chances of comparably paid reemployment. Other undesirable results should, if possible, be offset by compensatory actions. This could enhance the social net gain by avoiding leaving devasted populations or areas as unhappy by product of progress.

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LE PRIVATIZZAZIONI NEL MONDO OCCIDENTALE

La maggior parte delle privatizzazioni nel mondo occidentale sono state realizzate allo scopo di ottenere dei cambiamenti economici strutturali. Alcune, invece, hanno una motivazione principalmente finanziaria. Esse hanno comportato sia emissioni di azioni sia vendite dirette di proprietà. In Europa le principali candidate alla privatizzazione sono state le imprese di telecomunicazioni, le banche e le imprese di elettricità. Negli Stati Uniti, tuttavia, la maggior parte delle privatizzazioni si sono avute nelle industrie che forniscono servizi locali. L'esperienza indica che per la maggior parte le privatizzazioni aumentano l'efficienza e abbassano i costi. Il tasso di privatizzazioni è stato significativamente influenzato da considerazioni politiche locali. Le privatizzazioni risultano più efficaci quando possono stimolare la concorrenza.

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THE ADJUSTMENT MECHANISM OF COURNOT AND PARETO IN THE MONOPOLISTIC COMPETITION HYPOTHESIS

by
ALBERTO ZANNI *

On his arrival in Lausanne, Pareto stated: "The point on which I differ from professor Walras is this: whereas he can already envisage a time when reliable information can be obtained and economic phenomena can be predicted with certainty [...], I, for my part, consider such a time to be very remote, so remote that I do not even discuss it". (Pareto, 1894, p. 162).

1. I will start by clarifying the meaning of certain terms. Cournot says: (*i*) there is artificial *monopoly* when, in a given industry, there is an *inventor*, an entrepreneur endowed with industrial inventiveness; *ii*) if the inventor is the subject of a process of imitation by a duopolist, and then by a third, a fourth... oligopolist, then there is *competition of producers* (*concurrence des producteurs*), i.e. monopolistic or oligopolistic competition; *iii*) when monopolistic competition has developed to such an extent that the production q_i of a firm becomes a negligible part of industrial production Q (i.e. when $q_i/Q \rightarrow 0$ and a price p becomes invariant in relation to Δq_i), then there is *unlimited competition* (*concurrence indéfinie*), i.e. perfect and atomistic competition. Of course, in the transition from monopoly to atomistic competition, the price falls to cost level. Although Cournot's atomistic competition has made more converts than the Spanish Inquisition, we owe thanks to this great French scholar for employing three distinctly separate

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This article makes use of §§ 17-18 of a study by the author (1992) reporting some conversations that took place during a seminar in May 1989. In reusing these pages, I have profited from discussions with professors Marco Dardi and Aldo Montesano whom I wish to sincerely thank, discharging them from all responsibility for any possible error on my part.

terms denoting the process of monopolistic competition (the *competition*) itself, its initial state and its final state.

Things are not so clear with Pareto. When Pareto uses the term *free competition*, he is sometimes alluding to monopolistic competition as under (*ii*) above, and sometimes to the limit state in which firms "make neither a profit, nor a loss". Hence when Pareto does not give us a clue with the expression "limit state of free competition", it is hard to understand what he means.

Despite this difficulty, we might be able to reach an understanding of two of the points over which the students of Cournot, headed by Nash, have remained conspicuously silent [1]. These points are, first, a criticism levelled at Cournot by Pareto, and second, the meaning of "type I" and "type II" in Pareto's *Manuale*.

2. We know that Cournot's duopolists (1) and (2), who produce and sell quantities D_1 and D_2 at the price $p = f(D)$ – where $D = D_1 + D_2$ and where f is the inverse of the demand function $D = F(p)$ – reach a stable equilibrium on the basis of a non-co-operative behaviour which is generally interpreted as follows: during the process of convergence towards equilibrium, each of the two duopolists maximises his profit, assuming his competitor's quantity to be given. Pareto, too, adhered to this interpretation, which is justified by the way in which Cournot formalised his problem.

However, this is not the whole story. First, it does not specify that Cournot's duopolists did not choose a quantity [2] but a price strategy, as sensed by Bertrand (in contrast to the game theorists, from Shubik and J. Friedman to Daughety). Secondly, it overlooks the fact that, for certain

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[1] To the extent that *Cournot oligopoly*, a valuable anthology, edited by DAUGHETY (1988), does not even mention Pareto in the extended bibliography, pp. 45-60.

[2] The contemporary literature is unanimous in the opinion that Bertrand innovated on Cournot: *i*) because he suggested that the duopolists should select price as a strategic quantity instead of Cournot's quantity; *ii*) because he introduced the concept of consumers as "the third player". In my view, point (*i*) is untenable. In fact Bertrand (a) says *explicitly* that Cournot's duopolist "will lower his price to attract buyers", (b) accuses Cournot of not drawing the logical conclusions from this, and (c) explains this as due to an oversight: "because, through a peculiar oversight, he introduces under the names D_1 and D_2 the quantities sold by the two competitors, and treating them as independent variables". What matters most is that, when Cournot returned for the last time to his 1838 problems (COURNOT, 1877, p. 174), he made it clear that the strategy of a duopolist, whose competitor's quantity is at the beginning a random given datum, *is first a price strategy and only consequently a quantity strategy*. Cournot says, and I quote, that the duopolist "pourrait, avec un avantage momentané, modifier le prix, et par suite sa production" (the italics are mine).

unspecified reasons, Cournot's duopolist responds with a certain delay to the competitor's price reduction.

In fact, if we examine Cournot's thought, rather than the way in which he formalises it, we discover that the duopolist derives "*a temporary benefit*" (un "bénéfice momentané": Cournot, 1838, p. 92, 1960 p. 83) *from a reduction in price*. In brief, it is true that, in Cournot's view, duopolist (1) maximises his profit without having any "direct influence" on the quantity of (2). But Cournot also says that duopolist (1) will achieve this maximum "by properly adjusting his price" ("*en modifiant convenablement le prix*": 1838 p. 89, 1960, p. 80); and since duopolist (1) temporarily derives a profit from this, we must assume that (2) does not respond instantly, i.e., for a certain period, (2) leaves his own price [3] unchanged, leaving himself open to the risk of losing customers. To put it in another way, Cournot conceived the idea, not encapsulated in his formalisation (in fact he specified that in *competition* the product is homogeneous and the price a single one) that in monopolistic competition *separate prices coexist over the same period* as a result of the diachronic behaviour of the "players". If my interpretation is correct, I think I have to dedicate two remarks to the following criticism of Cournot by Pareto:

> "The fact that D_1 and D_2 can be taken as independent variables does not in the slightest imply the assumption of Cournot that the first monopolist cannot affect anything but D_1 and the second only D_2. On the contrary, in the case of [monopolistic] *competition*, which Cournot believes he is examining, the first monopolist can affect D_2 in taking customers from his rival and vice versa" (Pareto, 1911, trans. 1968, p. 67 – the italics and brackets are additions of mine).

My remarks are: *i*) it is true that Cournot's formalisation does not take into account that in monopolistic competition each of the duopolists could take customers away from his competitor; *ii*) but if I may distinguish between an author's thought and the way it is formalised, and if it is correct to interpret Cournot's thinking as meaning that the adversary responds with a certain timelag to the *price* strategy of a duopolist, then Pareto's interpretation of the French economist is a narrow one. In other words, I am convinced that it is the alpha and omega of the adjustment mechanism that Pareto, as we shall see, calls "type I", that makes up the substance of Cournot's thinking. Rightly or wrongly, I have just explained why I put Cournot's name before Pareto's in the title of this study, which is essentially devoted to the latter.

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[3] On this issue, I am taking up an interpretation of DMITRIEV (1904), an author who, unfortunately, does not even appear in DAUGHETY's bibliography (1988).

Before going on to Pareto, I should make some cautionary remarks. In the theory of industrial structures and general welfare Cournot's contributions were a good many, even if some of them have been ignored or forgotten. To give a first example, he maintained that with decreasing costs the greatest general welfare could be achieved through monopoly conditions. Secondly, he held that the greatest general welfare was definitely guaranteed by *co-operative agreement* between monopolists when one produces (*a*), and the other (*b*), i.e. two products which, as complementary inputs, contribute towards the production of a third good (*a, b*) [4]. I should therefore warn the reader that the focus of this study will be only on Cournot as integrating Ricardo's long run "natural profit" with monopolistic competition.

Although Walras, as we shall see later, opened the way to the theory of imperfect competition (product differentiation), he nevertheless closed many of the avenues previously opened by Cournot when he decided to overturn the latter's theory, starting off with the general hypothesis of unlimited competition and reintroducing monopolistic power as the exception to the rule (Walras, 1878 p. 1295). Marshall and Pareto, with their theories on *temporary unreproducibilities* and the rents associated with it, would later reopen these avenues. But with regard to Pareto, I must add a further cautionary remark. In the *Manuale*, Pareto analysed two types of competition: *a*) the competition that gratifies society by the nullification of profit associated with the reduction in product prices; *b*) *parasitic competition* that does not gratify society because the nullification of profit is associated with an increase in costs. I must therefore warn the reader that this study will deal only with competitive process (*a*).

3. Pareto links "type I" to free competition and "type II" to monopoly, making clear that these are behaviours referring to individual agents.

I will start with monopoly, which raises no doubts. Pareto says that we have "type II" when an agent (we will only consider entrepreneurs) has the strength to impose his *path*, i.e. the price, on his contractors. The monopolist, he adds, determines the price *deliberately*, i.e. as a result of a conscious calculation. And what about free competition?

In "type I", firms either accept the price in force on the market or quote one that is slightly less. Furthermore, they never *deliberately* modify

[4] Judging by DAUGHETY's anthology (1988), it looks as if the theorists who refer to Cournot-Nash's non-co-operative duopoly have missed the co-operative aspect present in chapter IX of Cournot's *Recherches* (1838, but see also COURNOT, 1877, pp. 175-76).

the existing price – they modify it only *involuntarily*. Now, we are so used to repeating that, under conditions of perfect competition, *every* firm is devoid of any strategy, that it is a *price-taker*, that we have forgotten that Pareto also associates "type I" to the (monopolistic) *competition process* and that, in this process, there is always an infringer, a firm that rebels against the existing price [5]. In short, to continue to repeat that under Pareto's conditions of free competition firms are always pricetakers means to forget that, during the process that culminates in the nullification of profit (a limit state which, in Pareto's view, does not have a real but a virtual nature), firms make small price reductions which are sometimes *offensive* and sometimes *defensive*.

If we abandon the models suggested by the non-co-operative game sequence where the incomplete and imperfect information of the players is relevant (see J. Friedman 1991), Pareto's "type I" can be represented diagrammatically as follows. From the time t_1 of the diagram below, the ith firm chooses a penetration price (it slightly reduces the price from p_1 to p_2) in the belief that competing firms will keep market price p_1 unchanged for a short while: over the period (t_1, t_2) the prediction turns out to be confirmed. At time t_2 the competitors bring the price down to level p_2 too. This would be the price for period (t_2, t_3) if another firm did not lower the price from p_2 to p_3 and the process did not continue until period (t_{n-1}, t_n) when we would end up with a single price and no firm would be making a profit (limit state of free competition) [6]. This, synthetically, is "type I" as it is inferred from the *Manuale* and *Manuel*, even if Pareto, instead of talking about prices and price reductions, talked about firms that follow *existing paths*, or *paths close to them* [7].

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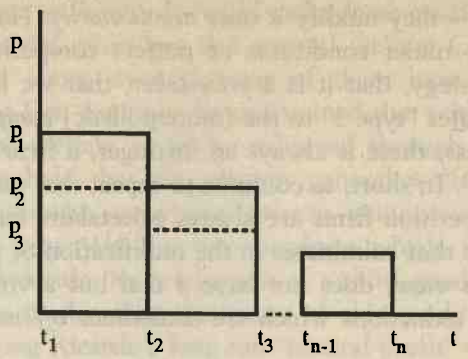
[5] See Chapter II, paragraphs 135-151 of *Manuale* and 116-131 of *Manuel*.

[6] AMOROSO (1930, p. 17) noted that the *practical* case of a firm that reduces its price to take customers away from its competitors cannot be mathematically represented. He did not realize that, instead of defending Cournot against Bertrand and Edgeworth, he should also have questioned the thinking of Cournot and Pareto. Most importantly, Amoroso failed to note that theories must also take into account price reductions that occur in competitive markets with a number of "imperfections". Later Maurice CLARK (1923) would follow Pareto in giving prominence to the fact that price reduction associated with the competition process implies the coexistence of different prices over the same period of time.

[7] An axiomatic representation should naturally look at prices as aggregates, each one of which, from one period to the other, displays at least one element that is lower than that of the previous period. There should also be restrictions on the size and number of firms over the period, as well as a hypothesis on the speed of the competitive process. In one of my early writings on Cournot (ZANNI, 1964) I suggested the hypothesis that firms were attracted into a given industry at a speed which increases in time with the level of industrial profit. In order to go beyond Cournot's hypothesis of an innovation una tantum, from which there follows the



Pareto says that "type I" is typical of the behaviour of agents under conditions of free competition, and "type II" typical of a monopoly, leaving us in the dark about classification of the multiple intermediate industrial structures lying between the *limit* case of the inventor monopolist and the *limit state* of free competition. However, on the duopoly, as we have seen, it is Pareto who blamed Cournot for thinking he was formalising *competition* when he was actually formalising something quite different (as Pareto let it be understood, Cournot formalised an *alternate symmetrical duopoly*). We are therefore led to assume that, in Pareto's view, the behaviour of the duopolists, and more generally that of the oligopolists, is "type I", if *they do not fight "ad excludendum"* for *absolute control of the market*. Besides, Pareto explicitly states (*Manuale* p. 202, *Manuel* p. 205) that firms follow behaviour pattern I when the structural data of the industry allows the entry of a first and a second firm (duopoly) (today this case is much valued in the literature on *contestable markets*) [8], but there is no "space for a third producer" (ibid.) because otherwise the equilibrium would fall outside the region with non-negative profit indexes [9].

In Pareto's view, however, it is "type II" that applies – one entrepreneur has the strength to impose his price – in the hypothesis of the *asymmetrical duopoly of Pareto-Stackelberg*, i.e. if one duopolist is a *price-leader* and dominates the other (*Manuel*, p. 60; it is worth noting that this type of

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gradual nullification of profit due to the workings of "*concurrence*", I assumed that, beyond a gradual expansion of supply over time, the entrepreneur would (with variations between one branch of industry and another) compare the profit to be made from a subset of existing industrial branches with the riskier, but higher profit to be had from a possible innovation.

[8] An assessment of Pareto in relation to the theory of contestable markets would require a separate article. I will therefore limit myself to recalling the "revisited book" by BAUMOL, PANZAR and WILLIG (1988).

[9] For a wider explanation, refer to ZANNI (1992, p. 107).

oligopoly is not mentioned in the *Manuale*) [10]. Pareto again made clear (ibid. p. 597) that when the duopolists fight to the bitter end for monopolistic control – this is what Stackelberg calls *Pareto's duopoly*, but I think it is better to attribute it to Bertrand, Edgeworth and Pareto [11] – both rivals choose "type II", a case that Pareto believes overdeterminate [12].

4. In the case of monopolistic competition, why are competing firms slow to respond to the small price reduction made by the infringing firm? Pareto, like Cournot, did not dwell on this problem. He merely said that he who slightly ("légèrement") modifies the slope of the path, i.e. who reduces the price, *"en tire avantage, pendant un court moment"* and that this behaviour would repeat itself through other firms until there was the total elimination of profits (*Manuale* p. 197-98, *Manuel* p. 201). One could obviously think that the infringing firm had organised itself for some time in

[10] I have called the hypothesis known as Stackelberg's asymmetrical duopoly "the Pareto-Stackelberg duopoly". In fact in the *Manuel* (1909, pp. 601-2) Pareto proposes a description of asymmetrical duopoly as follows: there is a firm which controls 80% of the market. It is a *price leader*, i.e. it sets the price. There are other firms which accept this price as in free competition. Pareto does not say whether there are two or more than *two price takers* and I am convinced (see also § 5) that, in Pareto's view, "type I" implies a behaviour in relation to price and not necessarily the atomism of Cournot's unlimited competition. In the Italian literature this type of market was called *partial monopoly*, GALLI (1956, p. 449 et seq.) being perhaps the only one to have called it "*imperfect competition*". In order to analyse the significant case, already signalled by Pareto, where there is a single *price taker*, it is sufficient to define the isoprofit curves so as to take into account that quantity Q in relationship with the price is composed of only two parts: q_1 and q_2. This is just what Stackelberg did in an article written in Italian (1933), whose importance is equalled only by the extent to which it has been ignored.

[11] STACKELBERG (1933, pp. 279-80) talks of Pareto's duopoly when the two duopolists defend, to the bitter end, *the optimum which each one of them would achieve in the event of a monopoly*, and he correctly concludes, that rather than being a prelude to an increase in the number of firms, this type of duopoly can culminate in growing industrial concentration. Although Pareto raised a formal problem on Edgeworth's duopoly (see note 12) that could justify the attribution of a type of duopoly to Pareto, the hypothesis of aggressive struggle is, essentially, reserved to Bertrand and Edgeworth.

[12] First in *Manuel* (p. 597), and later in *Economie mathématique* (1911), Pareto noted that if each duopolist seeks the highest profit, the problem is not mathematically indeterminate, but overdeterminate. Edgeworth understood that the remark was aimed at him, and in 1925, also remembering an early exchange of views with Marshall, he took advantage of the opportunity to note "that there is a certain indeterminateness about the use of the term "determinate" by economists" (1925, vol. II, p. 313). It seems to me that, in any case, Edgeworth accepted Pareto's distinction between indetermination and overdetermination even if this did not concern the substance of the issues at hand: "I dispute no man's definition of terms, concerned, rather, with the truth of propositions" (ibid., p. 313). In the meantime Pareto had died and there was no further chance for them to reach agreement once again.

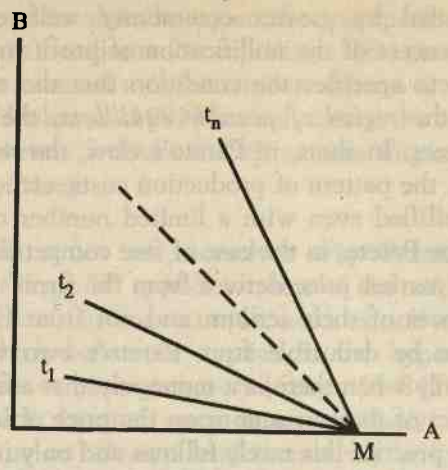
order to expand production *and* supply and that the competing firms, at first caught unawares, might also require an adequate period of time to organise a similar response. In all this there is nothing that goes against Pareto's general theory (against its temporary unreproducibilities), nor against his philosophy of market structures (we will mention these in the following paragraph). But I am of the opinion that in Pareto the delay in price reaction by competing firms implies limited knowledge, i.e. an imperfectly transparent market [13].

What is certain is that Pareto's "type I" has been overlooked and has sometimes occasioned ambiguities. Zawadzki, for example, albeit an excellent historian of mathematical economics, restricts it to a limit case and associates it to the two conditions by which Pareto characterizes the community's maximum utility, without even warning that for Pareto this maximum, in pure economics, is guaranteed by collectivism rather than by free competition. In his attempt to do Pareto justice, Pier Carlo Nicola (1991) also gives an interpretation of Pareto's "type I" and "type II", which I did not think I could ascribe to (see Zanni, 1992 and 1993). Led astray by Pareto's way of expounding his theory, he is prompted to believe that "type I" also includes the behaviour which Pareto calls "type II". Nicola does not realize that Pareto never confuses "type I" and "type II" and that he includes the behaviour of firms in monopolistic competition in "type I", as long as they are not fighting for monopolistic control and trying to impose "type II", and as long as asymmetric oligopoly does not recur with one oligopolist pursuing "type II' and the others "type I".

By making use of Pareto's *price range*, a range that is limited by path t_1 which is a feature of an inventor monopolist and by path t_n of a firm representative of the limit state of free competition, we can say that "type I" applies both to this limit state and the monopolistic competition process extending from t_1 to t_n, in the course of which certain firms make reductions that are sometimes offensive, and sometimes defensive.

5. Having clarified that Pareto's free competition, "type I", includes

[13] Apart from the passage from Pareto in the epigraph, three considerations prompt me to think so. First, as the former executive of a business enterprise, he knew that price reductions, especially when granted by way of "rebates", often remain concealed. Second, for the purposes of a theory on *business cycles* and the persistence of consumer habits, he tried to formalise certain lags in the supply reaction to price variations. Finally, I have the impression that the completely "perfect" market (rationality, transparency, homogeneity, and punctiformity) is a construction of the 1930s polemically projected onto all the economists of the previous generations.



(In Pareto's diagram A and B are two products and the prices are the slopes of the paths originating at *M*. In Pareto, when the path moves clockwise – when the price decreases – a representative consumer goes up on a curve of indifference with a growing utility index while a representative firm goes down on a curve of isoprofit with a lower index).

Cournot's monopolistic competition, one can pose the question as to whether the *limit state* of Pareto's free competition, when firm profits are zero, is equivalent to the exacerbated atomism of Cournot's unlimited competition as expressed by $q_j/Q \rightarrow 0$. I am inclined to rule this out for the following reasons.

Whereas Cournot (1838, p. 101, 1960, p. 90) regarded atomism on the production side as an approximately true hypothesis, Pareto, like Marshall, saw the limit state of free industrial competition as a fiction devoid of any correspondence to reality, even though he thought it useful for isolating the *tendency* towards the nullification of profits derived from temporary unreproducibilities. And there is a further point. Cournot shows that he is fully aware of the fact that the duopoly and monopolistic competition as he himself conceptualises them, are a reflection of specific conditions and do not fully account for all possible cases. Despite the criticism levelled at him by Marshall, Wicksell and Sraffa, he is also fully aware of the fact that the monopolist's production costs could decrease to the extent of preventing the emergence of *competition* and of the duopoly itself. In a passage from *Revues sommaire* (1877, p. 178-79), a masterpiece of logic that seems to have escaped the attention equally of Cournots' admirers and of his critics, he goes as far as to uphold that, in such a case, the monopolist's profits

could be accompanied by greater community welfare [14]. In any case, Cournot links the process of the nullification of profit to the multiplication of firms, while Pareto specifies the condition that the entry of new firms reaches a limit in the *region of possible equilibria*, the region with non-negative profit indexes. In short, in Pareto's view, the structural conditions (the level of supply, the pattern of production costs, etc....) make it possible for profits to be nullified even with a limited number of firms [15].

The fact that for Pareto, in the case of free competition, the *involuntary* modification of the market price derives from the firms' lack of knowledge as to the consequences of their actions, and not from Cournot's industrial atomism, appears to be deducible from Pareto's own writings, where he observes that it is only when there is a monopoly that a firm is in a position to calculate the effect of its own actions on the price of its inputs, and *even then not always* ("in practice this rarely follows and only in cases of monopoly": *Manuale*, p. 318-19, *Manuel*, p. 335). On the other hand, in *Cours*, where he differentiates the functions in order to determine the agents' optimum in the hypothesis of free competition, Pareto raises the question of whether or not the price variations caused *involuntarily* should be considered. He concludes that "in practice, no one takes this into account" (*Cours*, § 141), thus leading one to surmise that even the agents of free competition would, like the monopolist, consider prices to be variable if they could manage, in practice, to get to know, even slightly, these *indirect* effects. In other words, one gets the impression that in Pareto's view, to consider market prices as given under conditions of free competition is to depend on the lack of transparency. We have already come across this concept, as regards the delay in defensive reaction by the rival against a small price reduction by the "active" duopolist.

After Cournot, it was rather Edgeworth (1881, p. 212) who insisted on an "indefinite number" of agents who in the event of free competition contract and recontract. It was rather Pigou who defined free competition by referring to the seller's behaviour in relation to the price – as explained on p. 20 in Pareto's *Cours*, but with the addition of one condition which on that page does not exist: "the essential note of simple competition is that the supply of each seller constitutes so small a part of aggregate supply that..." (Pigou, 1912, p. 180). It is a fact that Pareto links "type I" to free

[14] See ZANNI (1992, § 5).

[15] Later on, AMOROSO (1921 and 1942): *i*) set the further condition that, in the equilibrium of competition, the price cannot be lower than the higher of two costs, the average cost and the marginal cost. He also determined the number of firms in a branch of industry, a point dealt with in a more sophisticated way by NOVSHEK and SONNENSHEIN (1988).

competition but nowhere does he equate free competition with the extreme atomism of Cournot's unlimited competition. In contemporary literature, Debreu (1959) has assumed a *finite* number of firms under free competition conditions and Hildenbrand (1983) has considered the two hypotheses to be contradictory. However, I doubt if Debreu was inspired by Pareto's non-contradictory hypotheses.

6. We should rather ask ourselves why Pareto does not specify whether "type I" or "type II" applies to some of the market structures which he took into consideration. For example, he does not say (though it can be easily intuited) which behaviour applies in the hypothesis that he calls *imperfect competition* or *quasi-monopoly* (*Cours*, §§ 841-42), i.e. in the case of productions which, by their very nature, (railways, tramways, gas and water supply, and so on) do not lend themselves to imitative competition and for which the optimum general welfare can, in his opinion, be achieved through public intervention. Neither does Pareto specify which behaviour prevails within the hypothesis which we currently call *imperfect competition*, i.e. when firms which benefit from transient profits as a result of product differentiation coexist. On the point of product differentiation, which was to have a disruptive effect on the concept of industry and the theory of value in the thirties [16], it is strange that Pareto did not resort to the concept of *cross elasticity* which is so omnipresent in Pantaleoni, and, also analytically, in the later Marco Fanno (1926). It was in fact with the concept of cross elasticity that Robert Triffin (1940), would later try to heal the rift in economic theory, even though he was unaware of the developments I have just described.

These lacunae in Pareto seem to be accounted for by his philosophy on market structures, "free competition" and duopoly in particular. Finally, this point of view deserves consideration, as follows: *i*) unlike Marx, Sweezy, Steindl, (and even Schumpeter, Amoroso, and Sylos Labini, to name only deservedly famous scholars), Pareto did not identify a general tendency both towards the disappearance of small businesses and towards industrial concentration; *ii*) Pareto considered that monopolistic power was more a feature of production than of consumption; *iii*) in the *Manuel* (mainly in the mathematical appendix, but see also §§ 61-70 of Chap. IV, devoted to substitute products) Pareto proposed a much more elaborate theory of market struc-

[16] In this respect, refer to BECATTINI (1962) and GEORGESCU ROEGEN (1967), bearing in mind that Becattini has been trying for over 20 years to reconstruct a dialectic theory that does not revolve around the concept of industry, but around a system of localised businesses within a "district".

tures than the one explicated in the *Cours* and the *Manuale*, for the reason that the profit associated with product differentiation, in Walras' imperfect competition hypothesis, had given rise to much debate and many ambiguities, at least in Italy [17]; *iv*) Pareto realized that, when agents with monopolistic power are structurally few, two at minimum, reality has many more verses than Horace's poems, i.e. it is open to a variety of solutions, quite irrespective of the innovations and the fortuities inherent in Cournot's philosophy (*fata viam invenient*). However, Pareto did not deem it necessary to remove this type of indetermination by pursuing the thousand or so "types of intermediate markets" ranged between competition and monopoly which were later the subject of countless writings in the thirties. While as a sociologist he debated why, in certain societies, human inventiveness should take the form of profit-making industrial inventiveness, as an economist he went no further than to focus only on the main forms of monopolistic power – we might even say of *Paretian unreproducibilities* – that restrain merely temporarily the basic tendency towards the wiping out of profit and the consequent price reduction. Looking at it more closely, the law of imitation which the sociologist Cournot (1861, vol. II, Chap. XIV) recognised in the globalization of the scientific and technical discoveries of the modern era, was an extension of a classical law of economics (imitative competition transfers scientific progress to the community via price reductions), which in substance was accepted by Pareto as well.

The fact that for a long time now the process through which the fruits of productive progress are distributed to society is no longer that of competition as discussed by Ricardo, Cournot, Walras and Pareto, i.e. price reductions for products and *monetary* remunerations unaltered, but instead through another process, that of the increase in *monetary* remunerations (favoured by Keynes "on account of... the greater ease of adjustment from

[17] In lecture XLI of the 2nd edition of *Eléments* (1889), Walras uses the expression *free competition* to mean the freedom of entry of firms which produce heterogeneous goods for classes of separate agents (the same chocolate wrapped in different ways), deriving profits that the competition tends to wipe out. GRAZIANI (1894) saw in this the proof that Walras' diversified prices are compatible only with a *monopoly*. It is a pity that TRIFFIN (1940) missed the fact that imperfect competition as introduced by Pareto in *Manuel* constitutes an implicit defence of Walras. The correction of a presumed mistake made by Walras, a correction which CASSOLA (1911, p. 24) attributed to JANNACCONE (1904, p. 325), was also overlooked. See the study I made in 1993, p. 255. After the famous Proudhon-Marx polemic on the *Philosophy of Poverty* and the *Poverty of Philosophy*, the suspicion that the concepts of *competition, product* and *industry* should harbour dialectic shades probably resurfaced in the mind of some Italian economists, when they read that Walras' *free competition* included the production of heterogeneous goods.

decaying to growing industries", 1936 p. 271), is a problem that I have deliberately not touched on. A comparison between Keynes' *long run* mechanism and Pareto's *parasitic competition* (also omitted in this study) might demonstrate the value of theoretical archetypes and at the same time show how vulnerable they are to the onslaughts of history.

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IL MECCANISMO DI AGGIUSTAMENTO DI COURNOT E PARETO NELL'IPOTESI DI CONCORRENZA MONOPOLISTICA

Questo scritto si occupa dei comportamenti che Pareto chiama il "tipo I" e il "tipo II" ed inizia con un confronto fra i duopolisti di Cournot e il "tipo I" paretiano. L'autore ritiene che questo punto della teoria di Pareto ha dato luogo a malintesi e che è sfuggito all'attenzione anche dei seguaci di Cournot che fanno capo a Nash.

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ASSETS VALUATION UNDER CONTINUOUS TIME: SOME REMARKS

by
GIANLUCA CASSESE *

I. *Introduction*

In the last fifteen years the theory of finance has been increasingly recast in the framework of continuous-time, stochastic models. The most immediate rationale for this translation comes maybe from the acknowledgement that markets work at an increasingly faster pace, approximating a continuous profile. But apart from realism there are at least two good reasons to adopt continuous time, entertwined one with the other. Under discrete time there is no clear and well founded distinction between flows and stocks since flows cannot but be defined as differences in stocks and are related to the "unit period" as a whole [1]. On the other hand if the time set is discrete we considerably constrain the ability of individual agents to choose the transaction dates and to differ one from the other under this respect: discrete time implies fixed intervention dates.

All this notwithstanding, the main feature of recent finance models is by far a technical one. It is in fact because of the existence of the theory of stochastic integration and of the powerful tools it provides economists with that it has become so common to write one's model with the specification of a continuous time set. The exploitation of this peculiar technique has

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I would like to express my gratitude to Andrea Beltratti for his encouragement. I also acknowledge my intellectual debt with Professor Lucien Foldes who introduced me to these studies. All errors are my own.

[1] Hence under discrete time it does not matter if the underlying model is specified in terms of stocks rather than of flows. This distinction is, on the contrary, essential with continuous time stochastic processes since here stocks will not in general admit to be represented as the integral of a corresponding density.

proved to be very efficient and has given both analytically nice and economically intuitive results. Among these one should mention the derivation of the so called CAPM (Capital Asset Pricing Model) and CCAPM (Consumption based Capital Asset Pricing Model) formulas. The former explains the drift of the dividend process in terms of the "correlation" between the diffusion of that same process and the *coefficient of relative risk*, and it is derived as the solution of the martingale problem for asset prices [2]. The latter describes the choice of the portfolio shares in terms of the "covariance" among the securities' yield and optimal consumption. This formula is derived from the maximisation of intertemporal utility under the constraint given by the stochastic differential equation describing the accumulation of wealth by means of the *Hamilton-Jacobi-Bellman* equation.

It is often remembered that there are conditions to be satisfied in order for such formulas to apply and that because of these requirements there are aspects that are forcefully to be left aside. On the other hand it is usual to comment upon the renowned efficient markets hypothesis that these models allow somehow to revive. The purpose of this paper is to exactly recall a number of conditions that CAPM and CCAPM imply and to discuss them in some connection with the efficient markets hypothesis. In fact we aim at deriving very general statements and to compare them with the better known and more explicit results that usually appear in the literature. To this end we will mainly make use of some results very common in the theory of finance and by means of these give a (hopefully) elementary explanation of how CAPM and CCAPM may fail to explain the basic valuation formula if we allow for some sort of discontinuity.

The paper is organised as follows. In the first paragraph we sketch the model and define the main variables that appear in it. In the second one we give a necessary and sufficient condition under which an equivalent martingale measure may be said to exist: the result, being very general, is also quite criptical and far less palatable than the current formulations in terms of relative risk coefficients and the like. A few special results will be derived under the conditions that have very recently appeared in the literature. In paragraph three we illustrate the CCAPM formula giving a hint about its derivation and assuming in particular absolute continuity of the price characteristics. This will serve as a survey of the subject. Eventually we will illustrate in a simple way some criticisms that may be raised against the model itself.

[2] That is the problem of finding an appropriate measure under which prices follow a martingale process, as will be explained below.

II. *The Model*

Let it be given a stochastic basis, (Ω, S, P); $(A_t|\mathbf{T})$, where (Ω, S, P) is a standard probability space, $\mathbf{T} = [0, T]$ is the time domain and $(A_t|\mathbf{T})$ denotes a *filtration* satisfying the usual assumptions [3] with $A_0 = \{\varnothing, \Omega\}$ and $A_T = S$. All processes to be mentioned in the sequel will be defined on such a basis and up to indistinguishability. Adaptness to $(A_t|\mathbf{T})$ will hence be the standard measurability requirement. Notation for processes will be as follows: $\mathcal{O}$ and $\mathcal{P}$ will respectively indicate the classes of *optional* and *predictable* processes, $\mathfrak{M}$ (resp. $\mathfrak{M}_{loc}$, $\tilde{\mathfrak{M}}$, $\mathfrak{M}^2$) will denote the class of *martingales* (resp. local-, uniformly integrable-, square integrable-martingales), decomposing in a unique way into a continuous and a totally discontinuous part, i.e. $\mathfrak{M} = \mathfrak{M}^c \oplus \mathfrak{M}^d$; $\mathcal{V}$ (resp. $\mathcal{A}$) will be used for the set of finite variation processes (resp. of integrable variation) and $\mathcal{S}$ (resp. $\mathcal{S}^p$) for semimartingales (resp. special semimartingales). Hence, $\mathcal{S} = \mathfrak{M}_{loc} + \mathcal{V}$ and $\mathcal{S}^P = \mathfrak{M}_{loc} \oplus (\mathcal{V} \cap \mathcal{P})$ are the standard definitions [4] for semimartingale and special semimartingale processes, thanks to which whenever $X \in \mathcal{S}$ we may like to write $X = M^x + V^x$ with $M^x \in \mathfrak{M}_{loc}$ and $V^x \in \mathcal{V}$: the decomposition will be understood to be unique if and only if $V^x \in \mathcal{V} \cap \mathcal{P}$ that is whenever $X \in \mathcal{S}^p \cdot [\cdot, \cdot]$: $\mathcal{S} \times \mathcal{S} \to \mathcal{V}$ and $<\cdot, \cdot>$: $\mathfrak{M}^c_{loc} \times \mathfrak{M}^c_{loc} \to \mathcal{V}$ are the usual square bracket and angle bracket processes, the former defined as the *quadratic (co)variation* of two semimartingales, the latter as the continuous part of the former and having as its domain the continuous, local martingale part of semimartingale processes. For any process X, ${}^pX$ will denote its *predictable projection*; for $X \in A_{loc}$, X^p will be its *dual predictable projection or compensator* defined as the unique predictable process such that $X - X^p \in \mathfrak{M}_{loc}$ [5]. Eventually, for any $\zeta \in \mathcal{S}$, $\mathcal{E}(\zeta)$ will stand for the unique solution of the *Doléans-Dade* stochastic differential equation $X_t = X_0 + \int_0^t X_{s-} d\zeta_s$ [6]; $\mathcal{L}(\cdot)$ will be its inverse: a noticeable property of these two transformations is that $\mathcal{S}$, $\mathfrak{M}_{loc}$, $\mathfrak{M}$ happen to be stable spaces with respect to them.

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[3] That is, (*i*) every σ-algebra A_t is completed with all the P-null sets of S, (*ii*) $s < t$ implies $A_s \subset A_t$, i.e. monotonicity and (*iii*) $A_s = \bigcap_{t > s} A_t$, i.e. right-continuity.

[4] A completely different but equivalent definition for semimartingales has been proposed by PROTTER (1986 and 1990).

[5] For a rigorous definition see MEYER (1974) or JACOD and SHIRYAEV (1988, p. 32).

[6] Its explicit formula is given by $\mathcal{E}(\zeta)_T = \exp\left\{\zeta_T - \frac{1}{2} <\zeta^c, \zeta^c>_T\right\} \prod_{t \le T} (1 + \Delta\zeta_t) e^{-\Delta\zeta_t}$.

The price process – inclusive of net returns – will be modelled via a $d + 1$ – dimensional, strictly positive semimartingale (that is strictly positive for any $t \in \mathbf{T}$, P-a.s.), $q \in \mathcal{S}_{++}$; the *Doléans-Dade* transform of prices, $\zeta \equiv \mathcal{L}(q) \equiv (\mathcal{L}(q^0) \ldots \mathcal{L}(q^d))^T$ will play a central part in the model and its characteristics will be indicated by V^i and M^i for $i = 0, \ldots, d$; for $i = 0$ we assume $M^i = 0$ and V^i to be continuous, thus identifying the corresponding title to a riskless bond. The portfolio strategy will be indicated by a vector process θ belonging to the $\Theta \subset L^2([q])$ of those optional processes for which [7] $E\int_0^T \theta_{t-}^T d[q]_t \theta_{t-} < \infty$: the integral $\int_0^t \theta_{s-}\, dq_s$ is thus well defined for any t P-a.s.

The individual deriving utility from consumption will have to invest an initial wealth of W_0 and the proceedings of future private income, e_t, into portfolio shares in order to finance consumption all over the given time period, according to the following stochastic differential equation

$$W_t = W_0 + \int_0^t \theta_{s-}\, dq_s - \int_0^t (c_s - e_s)\, ds \qquad \forall_{[0,\,T]}\, t,\ P\text{-a.s.} \qquad (1)$$

where $W_t = \theta_t \cdot q_t$. We could either impose $W_t \geq 0$ $\forall_{[0,T]}\, t$, P-a.s. or define the time horizon through stopping by setting $T \equiv \{\inf t \in \mathbf{T} | W(t, \omega) \leq 0\}$: let Θ be defined so as to satisfy the former constraint. Let $C(W_0, \theta, e)$ be the set of those consumption processes $c \in C$ – hence optional and non negative – that satisfy (1) for given initial wealth, portfolio strategy and perspective income; $C(W_0, \Theta, e)$ be the union of such sets over Θ; omission of the term W_0 will be for ease of notation while e will be suppressed only when identically nil.

A representative agent is supposed to maximise the cumulative expected value of the felicity function u and the expected value of utility from final wealth, that is

$$\max_{c \in C(\Theta, e)} \Phi(c) = E\left\{\int_0^T u(c(\omega, t); \omega, t)\, dt + V(W_T)\right\} \qquad (2)$$

All utility functions will be taken to be twice continuously differentiable with first derivative equal to infinity at the origin and concave. An

[7] Superscript T denotes transposition.

auxiliary process that will appear later is the portfolio shares process defined as $\pi^j_t = \frac{q^j_t \theta^j_t}{W_t}$ for all j and as π_t in vector notation: $\hat{\pi}_t$ will be the vector obtained from π_t deleting the first component.

CAPM deals with a suitable way of transforming the budget constraint (1), while CCAPM is to be derived from the explicit solution to (2). In order to perform such transformation of the budget constraint and to recover a reduced form, suppose $\beta \in \mathcal{S}_{++}$. It is thanks to a straightforward application of Îto's lemma that we may conclude that

$$\begin{aligned}
\tilde{W}_t \equiv W_t \beta_t &= W_0 + \int_0^t W_{s-} d\beta_s + \int_0^t \beta_{s-} d W_s + [W, \beta]_t \\
&= W_0 + \int_0^t W_{s-} \beta_{s-} d \mathcal{L}(\beta)_s + \int_0^t W_{s-} \beta_{s-} \pi^T_{s-} d \mathcal{L}(q)_s + \\
&\left[\int W_- \pi^T_- d \mathcal{L}(q), \beta \right]_t - \int_0^t c_s \beta_{s-} d s - \left[\int c_s d s, \beta \right]_t \\
&= W_0 + \int_0^t W_{s-} \beta_{s-} \pi^T_{s-} d \mathcal{L}(q \beta)_s - \int_0^t c_s \beta_s \, \mathrm{d} s \qquad (3) \\
&\equiv \tilde{W} + \int_0^t \tilde{W}_{s-} \pi^T_{s-} d \tilde{\xi}_s - \int_0^t \tilde{c}_s d s
\end{aligned}$$

Different normalisation procedures may be considered in order to obtain a single equation out of an uncountable number, the most popular of which is labelled CAPM.

III. *A General CAPM*

A *martingale density* for q is a stochastic process $Z \in \mathfrak{M}_{loc}$ such that $q\,Z \in \mathfrak{M}_{loc}$; $Q(B) \equiv E\{Z_t\, 1_B\}$ for $B \in A_t$ and 1_B its indicator is a martingale measure for q *locally* equivalent to P. If Z, $q\,Z$ belong to $\tilde{\mathfrak{M}}$ then we shall call Q an *equivalent martingale measure* (for q). Suppose such a process Z exists and is unique: in this case we will say that markets are complete [8] and this will be considered equivalent to local martingales

[8] For a formal proof of the equivalence of this definition with the more common one, see HARRISON and PLISKA (1981 and 1983).

admitting the so called *representation property* with respect to q [9]. The martingale nature of transformed price processes is commonly interpreted as a change to no-arbitrage units and is related to absence of arbitrage. Notice that all involved processes and functionals are invariant under equivalent probability transforms since the filtration itself is. It is a well known fact of financial economics that the martingale transform of prices may fail to be fully equivalent, i.e. that the transformed price process may only be taken to be a *local* martingale. What goes wrong with an infinite time domain is an integrability requirement which does not allow for a full exclusion of arbitrage opportunities although restricts their set to very special cases such as the so called *doubling strategies* [10]. In fact a necessary and sufficient condition for local equivalence of martingale measures to translate into a global property is that $Q\{\sup_t Z_t < \infty\} = 1$ and $P\{\inf_t Z_t > 0\} = 1$ [11]. Nevertheless some interesting interpretations are still possible even in the weaker form, since existence of a martingale density and the non negativity constraint on the wealth process are easily shown to be a sufficient condition to rule out arbitrage opportunities. In fact these two conditions imply from (3) above that, expressing processes in no arbitrage units (i.e. with $\beta = Z$), $\tilde{W}_t + \int_0^t \tilde{c}_t$ is a non negative local martingale, hence a supermatingale, so that $W_0 \geq E_P\left\{\tilde{W}_T + \int_0^T \tilde{c}_t\, d\,t\right\} = E_Q\left\{W_T + \int_0^T c_t\, d\,t\right\}$ [12].

[9] The set $\mathfrak{M}_{loc}$ on a given filtration admits the representation property with respect to $X \in \mathfrak{M}_{loc}$ if for each $Y \in \mathfrak{M}_{loc}$ there exists a process $H \in \mathcal{S}$ such that $E\left(\int H^T d\right| <X> H) < \infty$ and such that $Y^c = \int H dX$. This is in fact only the *continuous part* of the theorem, since the representation of the discontinuous part of it is much more complicated and less intuitive. For a general statement see JACOD and SHIRYAEV (1988, p. 172). It has to be strongly remarked that this is a condition hinging on the nature of the underlying filtration: in fact it amounts, roughly speaking, to restrict the information on (the local martingale nature of) processes to what is actually revealed by prices. For an example of the usual assumptions on the filtration see KARATZAS et al. (1986 and 1991).

[10] On doubling strategies see HARRISON and KREPS (1979).

[11] This conclusion may easily be derived from JACOD and SHIRYAEV (1988, proposition 3.5, p. 154).

[12] Portfolio and consumption processes that belong to the budget set satisfy hence this inequality, under completeness of markets also the reverse holds (a proof of this fact may for example be found in COX and HUANG, 1991, and in JEANBLANC-PIQUÉ and PONTIER, 1990) so that the latter may be taken to be an equivalent definition of the budget set.

We state hence the following fairly general result.

PROPOSITION 1. *For $Z \in \mathfrak{M}_{loc}$ the following is a necessary and sufficient condition for the existence of a martingale density:*

$$(V + [\mathcal{L}(q), \mathcal{L}(Z)])^P = 0 \tag{4}$$

for at least one decomposition of the semimartingale $\mathcal{L}(q)$.

Proof Consider $qZ \in \mathfrak{M}_{loc}$ $\mathcal{L}(qZ) = \mathcal{L}(q) + \mathcal{L}(Z) + [\mathcal{L}(q), \mathcal{L}(Z)] \in \mathfrak{M}_{loc}$ and since, by definition, $\mathcal{L}(Z) \in \mathfrak{M}_{loc}$ then $\mathcal{L}(qZ) - M - \mathcal{L}(Z) = V + [\mathcal{L}(q), \mathcal{L}(Z)] \in \mathfrak{M}_{loc} \cap \mathcal{V}$: hence this must be a process of locally integrable variation [13] and its dual predictable projection must thus be nil [14]. All the decompositions implied are unique up to indistinguishability, hence also the reverse implication holds.

This proposition also admits of several further specifications, among which the following is worth mentioning.

COROLLARY 1. *For $Z \in \mathfrak{M}_{loc}$ the following is a necessary and sufficient condition for the existence of a martingale density:*

$$\begin{cases} V^c = -(M^c, \mathcal{L}(Z)^2)) \\ {}^P(\Delta V) = -{}^P(\Sigma \Delta\mathcal{L}(q) \Delta \mathcal{L}(Z)) \end{cases} \tag{5}$$

for at least one decomposition of the semimartingale $\mathcal{L}(q)$.

Proof. This is the consequence of the unique way of decomposing local martingales into a continuous and a totally discontinuous part. Since the integral of the variation is a norm for processes in $\mathcal{A}_{loc}$, the fact that $X \in \mathcal{A}_{loc}$ and $X^d \in \mathfrak{M}^d_{loc} \cap \mathcal{V} \subset \mathcal{A}_{loc}$ implies, by triangular inequality, $X^c \in \mathcal{A}_{loc}$: replacing X by $V + [\mathcal{L}(q), \mathcal{L}(Z)]$ this argument allows to apply the compensation procedure component by component. The last step is made by remarking that for $X \in \mathcal{A}_{loc}$, ${}^P(\Delta X) = (\Delta X)^P$ so that (5) follows.

COROLLARY 2. *Suppose that $q \in \mathcal{S}^p$ and $qZ \in \mathcal{S}^p$ then condition* (4) *reduces to:*

$$V = -(\mathcal{L}(Z), M)^P \text{ [15]} \tag{6}$$

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[13] JACOD and SHIRYAEV (1988, lemma 3.11, p. 29).

[14] *Ibidem* (theorem 3.18, p. 33).

[15] Condition (6) is also derived by BACK (1991, theorem 1, pp. 379-382) and by SCHWEITZER

where $(\cdot)^P$ *coincides here with the predictable compensator of* $\mathfrak{L}(Z)M$.

If $q \in \mathcal{S}^p$ then also $\mathfrak{L}(q) \in \mathcal{S}^p$, hence $V \in \mathfrak{F}$, $[\mathfrak{L}(Z, V] \in \mathcal{V} \cap \mathfrak{M}_{loc} \subset \mathcal{A}_{loc}$ [16] and its compensator is nil; the finite variation part of a special semimartingale is also of integrable variation [17] and coincides with its dual projection: according to the same argument appearing in the proof of the preceding corollary, (4) is then equivalent to $V + ([\mathfrak{L}(Z), M])^P = 0$. An application of the integration by parts formula, standard properties of stochastic integrals and uniqueness of the decomposition for special semimartingales show that $(\mathfrak{L}(Z), M)^P$ coincides with $([\mathfrak{L}(Z), M])^P$.

Expression (5) is to be considered as a generalised CAPM formula in which $\mathfrak{L}(Z)$ plays the role of the so called *relative risk coefficient*. The usual CAPM formula may be derived as follows.

COROLLARY 3. *Suppose that markets are complete and that prices are continuous then (4) translates into*

$$dV \ll d\langle M \rangle \tag{7}$$

that is $dV = h\, d\langle M \rangle$ *for some* $h \in L^2(\langle M \rangle)$.

Proof. Continuity of q implies that $[\mathfrak{L}(Z), \mathfrak{L}(q)] = [\mathfrak{L}(Z), M] \in \mathcal{A}_{loc}$ and $([\mathfrak{L}(Z), M])^P = (\mathfrak{L}(Z), M)$; from market completeness we know that there exists $h \in L^2(\langle M \rangle)$ such that $\mathfrak{L}(Z)_t = \int_0^t h_s^T\, dM_s$.

This is the familiar formula asserting that the drift of the dividend process may be explained in terms of the "correlation". (7) being a special case of (5), as it has been shown, we may thus employ the latter as a benchmark to evaluate departures from such limiting assumptions as the ones appearing in the former.

Remark that in the more general case also appears a discontinuous CAPM formula, and, particularly, that the predictable component of jumps has to be compensated by correlation with the jumps in the relative risk coefficient. This first rules out the unpredictable part of processes: for what

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(1992 theorem 3, pp. 370-371) but in a way considerably more complex and less general than what done here.

[16] It is a direct consequence of the so called Yoeurp's lemma, for which see JACOD and SHIRYAEV (1988, proposition 4.49 c), p. 52).

[17] See proposition 4.23 in JACOD e SHIRYAEV (1988, p. 44).

concerns arbitrage we may content ourselves with processes whose times of discontinuity be announced by an appropriate sequence of stopping times. In fact a trading strategy, by the very same way in which it has been defined, cannot be made to depend upon inaccessible events. Secondly, the jumps of the relative risk process will be orthogonal to jumps of the price process that occur only in the local martingale part, and let the finite variation component unchanged. Thus, following Back (1991), we may like to identify jumps in the local martingale part as *idiosyncratic risk* compared to the *general risk*, reflecting in the jumps of the process $\mathcal{L}(Z)$.

General models further assume absolute continuity of the price process characteristics from which it is easy to eventually derive

$$\mu_t - \mathbf{1}_d r_t \in \text{span}(\Sigma_t) \tag{8}$$

where $\mu_t \equiv \frac{d}{dt} V(\omega, t)$, $r_t \equiv \frac{d}{dt} V^0(\omega, t)$ and Σ_t is the matrix $[\sigma_t^{i,j}]$ with $\sigma_t^{i,j} \equiv \frac{d}{dt} <M^i, M^j>_t i, j \geq 1$. (8) is often considered to be the explicit formulation of CAPM.

IV. *A General CCAPM*

A natural candidate for the relative risk process is the marginal utility from consumption along the optimal path. A general result by Foldes (1990) implies that with continuous price processes (but regardless of completeness of markets), problem (2) admits solution if and only if this is the case: discontinuities, though, provide an exception to such a rule. In order to recover the optimal solution to the consumption problem, a standard tool is the so called *Hamilton-Jacobi-Bellman* equation that we now propose to discuss.

Let us adopt the following notation. Let C_t be the restriction of the consumption set C to processes starting at t (and nil up to then), and $C_t(W_t)$ the budget set defined over C_t with initial wealth W_t. Define hence

$$\Psi(t, W_t) \equiv \max_{c \in C_t(W_t)} E\left\{ \int_t^T u(c_s)\, ds + V(\theta_T \cdot q_T) | \mathcal{A}_t \right\}$$

and $\Lambda(t, c) \equiv \int_0^t u(c_s)\, ds + \Psi(t, W_t)$, with $W_t = W_0 - \int_0^t e_s\, ds +$

$\int_0^t \theta_s \, d\, q_s$. Being a submartingale, Λ may be decomposed in a unique way – according to the well known *Doob-Meyer* theorem – as $\Lambda(t, c) = A_t + M_t$ with A_t an increasing process and $M_t \in \mathfrak{M}_{loc}$. Actually, $\Lambda(t, c) \in \mathfrak{M}_{loc}$ when c is the solution to (2) and only then: so the problem is formally equivalent to

$$0 = \min_c A_t(c), \text{ i.e. } 0 = \min_c E\{\Lambda(t, c) - \Lambda(r, c) | A_r\}, \text{ with } t > r \quad (9)$$

If Λ may be proved to be twice continuously differentiable, then, by a straightforward application of Îto's lemma and passing to the limit under the integral sign, the *HJB* equation is derived, in the following formulation

$$0 = \Psi_t + \max_{c,\theta} \left\{ u(c_t, t) - \Psi_w c_t + \Psi_w W_t \pi_t^T d\, V + \frac{1}{2} \Psi_{WW} W_t^2 \pi_t^T d\,(M)\, \pi_t \right\} \quad (10)$$

Under absolute continuity of the characteristics of the process $\mathfrak{L}(q)$, (10) is equivalent to

$$0 = \Psi_t + \max_{c,\theta} \left\{ u(c_t, t) - \Psi_w c_t + \Psi_W W_t \pi_t^T \mu_t + \frac{1}{2} \Psi_{WW} W_t^2 \pi_t^T \begin{bmatrix} 0 & \\ & \Sigma_t \end{bmatrix} \pi_t \right\} \quad (11)$$

Denoting by v the inverse of the marginal utility of consumption and by $\hat{\pi}_t$ the portfolio vector deprived of the first component, simple differentiation eventually gives

$$c^* = v\{\Psi_w\} \quad (12.a)$$

$$\mu_s = \mathbf{1}_s r_s - \frac{\Psi_{WW} W_s^*}{\Psi_W} \Sigma_s \hat{\pi}_s^* \quad (12.b)$$

that, under the assumption that prices be at their equilibrium level, coincides with CCAPM. Notice that the continuity properties of Ψ and of the

utility function (12.a) and (12.b) imply that the optimal consumption and portfolio rules are adapted to the natural filtration of the price process (i.e. the minimal filtration with respect to which the price process is measurable), $(A_t^q|\mathbf{T})$. This is interpreted to mean that optimal policies may be decided and implemented on the basis of the information revealed by prices: that is markets are efficient [18].

From comparison of (9) versus (12) it stems out that the former is a necessary and sufficient condition, while the latter only sufficient: this implies that even under the most favourable conditions equation (12) need not hold for all optimal solutions. Furthermore, in order to recover equation (12) the price process must be absolutely continuous, the value function must be twice continuously differentiable and it must be possible to pass to the limit under the integration sign. We try to comment on the economic meaning of these analytical conditions.

For what concerns absolute continuity of the price process, this is a requirement without which the described optimal policies may simply not exist at some date/event, but its nature is hardly economic at all. It is in the very nature of stochastic continuous models not to imply absolute continuity and it is on the contrary quite curious that economists who seem to appreciate this class of models still are keen on solutions defined date by date. Differentiability of the value function has been proven for quite general classes of processes [19] making full use of the complete markets

[18] A rather explicit formulation of the optimal consumption process may be derived from (11) by noting that its solution may be conjectured to be a C^2 function $c^* = f(W^*)$. Then differentiating (10) with respect to W gives

$$0 = \Psi_{t,W} + \Psi_{W,W}(W\pi^T\mu - c) + \frac{1}{2}\Psi_{W,W,W}W^2\pi^T\Sigma\pi + \Psi_W r$$

Hence, by Îto's rule, we get

$$d\mathfrak{L}(u'(c^*)) = \frac{\Lambda_{W,W}W}{\Lambda_W}\pi^T dM - r dt$$

From this we conclude that *i)* $u'(c^*)\,q^0 \in \mathfrak{M}_{loc}$ and is a martingale density for the normalised price process $\frac{q_t}{q_t^0}$; *ii)* the optimal consumption plan has the form

$$c_t^* = v\left(\mathcal{E}\left\{-\int_0^t \frac{\pi_s^T(\mu_s - \mathbf{1}_d r_s)}{\pi_s^T\Sigma_s\pi_s}\pi_s^T dM_s - \int_0^t r_s\,ds\right)\right\}$$

[19] See for example JEANBLANC-PIQUÉ and PONTIER (1990), and references therein.

hypothesis: under incompleteness it is not clear whether this property will continue to hold and the *HJB* equation to be a viable approach [20]. Even if it did, however, the efficient markets corollary of the CCAPM would likely fail. In fact, under incomplete markets, $C(\Theta, W_0, e) \neq C\left(\Theta, W_0 + E_Q\left\{\int_0^T e_t\, dt\right\}\right)$ so let us set $x_s \equiv c_s - e_s$ and $\tilde{u}(x_s) \equiv u(x_s + e_s)$ and substitute into the first order conditions to find

$$c_t^* = \tilde{v}\left(\mathcal{E}\left\{-\int_0^t \frac{\hat{\pi}_s^T(\mu_s - \mathbf{1}_d r_s)}{\hat{\pi}_s^T \Sigma_s \hat{\pi}_s} \hat{\pi}_s^T\, dM_s - \int_0^t r_s\, ds\right\}\right) + e_t$$

Clearly, if e is not adapted to $(A_t^q|\mathbf{T})$ so will also be c^* [21]: in this case the agent will own private information deriving from labour income. This is the way to introduce *insider trading* into this class of models.

Eventually, exchanging limit and expected value implies ruling out the existence of jumps that may not be offset by an appropriate choice of the semimartingale decomposition: clearly the prescribed optimal consumption policy would not exist if for some date/event the finite variation part of the involved processes presented a jump. This kind of discontinuity would affect the choice problem in exactly the same way as the no-arbitrage one. In order to see this more clearly consider a *CRRA* utility function, with coefficient δ, and constant drifts μ and define the set $\mathbf{Q}(\Sigma) \equiv \{q_t|\mu \in span(\Sigma_t)\}$ [22] to be the set of financial prices whose finite variation component is absolutely continuous with respect to the quadratic covariation of its martingale part. This is the set on which equation (12.b) has solution, explicitly given by $\pi_t = \frac{1}{2}\alpha_t$ – where $\mu = \Sigma_t \alpha_t$ – that is by a linear and

[20] If the value function is not twice continuously differentiable the *HJB* solution is replaced by the so called *viscosity* solutions. See DUFFIE and ZARIPHOPOULOU (1993) for an application.

[21] Notice though that the efficient markets hypothesis is not entirely ruled out even in this particular case. In a genuine equilibrium model the price process is in fact not given but results from market clearing conditions and so is $(A_t^q|\mathbf{T})$. Hence adaptness of private endowments to the latter filtration may be restored through *tâtonnement*.

[22] Here we consider Σ as a primitive of the model. This is legitimate since, under complete markets, the local martingale processes involved in the model are all derived from a given set of martingales that has the representation property with respect to the given filtration.

hence continuous function. Since $\mathbf{Q}(\Sigma)$ is open by definition in the topology of pointwise convergence, consider a sequence $\{q_t^n\}$ such that $q_t^n \in \mathbf{Q}(\Sigma)$ and $q_t^n \to \bar{q}_t \notin \mathbf{Q}(\Sigma)$ and let $\{\alpha_t^n\}$ and $\{\pi_t^n\}$ be the corresponding sequences. Since by definition α_t^n diverges, we will have $\lim_{q_n \to \bar{q}} \|\pi(q^n)\| = \infty$ because $\mu \in span(\Sigma)$ implies that as long as the variability of prices is reduced agents will be less and less able to hedge against the risk implicit in the returns structure – so there will not be any longer a risk neutral measure – unless going unboundedly short in some asset: it is the case for arbitrage. Jumps in the price process that may not be entirely compensated pose exactly the same kind of problems since their effect is to violate the condition $q_t \in \mathbf{Q}(\Sigma)$. Cases as the general diffusion processes, resulting from a sum of pure diffusion and point processes, may still be admitted [23] but a more general class of discontinuous processes will definitely imply a break down of equation (12) while still being perfectly compatible with equation (9) above.

V. *Conclusions*

In the previous paragraphs we touched upon some well established results of financial economics, the way they are usually expressed in continuous time stochastic models. We derived very general formulations for CAPM and CCAPM and specialized them later on to more familiar expressions. Although equation (6) has quite recently been considered to be of its own interest, nevertheless it has been remarked that in general the solutions to these models are constrained to satisfy conditions that are quite restrictive in contrast with the great generality that the adopted technique would allow. In fact it is for example widely accepted to specify completely the price process – in most cases a Wiener or a diffusion process – while it would be economically much more interesting and meaningful to describe prices by selection of an appropriate class – that cannot be but semimartingales.

Due to the technical burden of stochastic calculus, financial models are not always perfectly clear about the role of the underlying assumptions. For instance, assuming completeness of markets is by itself quite near to assume that they are efficient, while it would be most interesting to establish a clearcut difference between the two concepts. On this particular point it has to be recalled that apart from this special case the structure of individual endowments *will* matter when deciding upon optimal consumption and

[23] This case has been exhaustively analysed in JEANBLANC-PIQUÉ and PONTIER (1990) to which the interested reader is referred. See also BARDHAN and CHAO (1993).

portfolio plans. We showed this in a particularly naive way, i.e. assuming to have enough continuity of the value function to apply the *Hamilton-Jacobi-Bellman* equation. A proper investigation of this aspect would however require more general solution concepts.

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LA VALUTAZIONE DELLE ATTIVITÀ IN TEMPO CONTINUO: ALCUNE OSSERVAZIONI

In gran parte dei modelli finanziari è divenuto consueto far uso delle tecniche del calcolo stocastico anche qualora si attribuisca significato economico esclusivamente ad alcune specifiche formulazioni dei risultati. Lo scopo di questo lavoro è quello di affrontare alcuni problemi finanziari classici ad un livello di analisi assai generale e mostrare quanto restrittive siano le assunzioni che debbono essere fatte al fine di ottenere espressioni sufficientemente ben fatte. Si esprimono inoltre alcuni commenti circa la proposizione generale secondo la quale il CCAPM supporti l'ipotesi dei *mercati efficienti*.

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HABIT PERSISTENCE, MEASUREMENT OF BENEFITS, AND THE DETERMINANTS OF WELFARE PARTICIPATION

by
YU HSING *

I. *Introduction*

Over the years the federal government has passed laws and created programs to reduce cost and increase work incentive of the welfare system. These include the 1961 Unemployed Parent (UP) program, the 1967 Work Incentive Program (WIN), the 1981 Community Work Experience Program (CWEP), the Job Opportunities and Basic Skills Training (JOBS) program established by the Family Support Act of 1988, the Child Support Enforcement (CSE) program, and the 1990 Head Start program. To further overhaul the welfare system, the White House, the Congress and states have recently proposed the following: to only allow welfare recipients to stay in the system for a maximum of two years, to require compulsory work after two years either in the private or the government sector, to combine numerous welfare programs into block grants, to give individual states more autonomy and flexibility, to repeal or reduce welfare benefits for legal immigrants and unmarried mothers who are under the age of 18, to take measures to reduce teen pregnancy, to build orphanages to raise children from unfit parents, and the like. Disagreements are found among different political parties and states, and these proposals may or may not be passed by the Congress [1].

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[1] For reviews and criticisms of the public policy on welfare, see BURTLESS (1990), CHAMBERS (1989), GIDEONSE and MEYERS (1989), and GUERON (1990).

It is proper to re-examine the determinants of the size of welfare recipients across states so that the government may find ways to improve the system. This paper differs from previous studies in several aspects. First, three types of benefits – cash payments, food stamps, and Medicaid (medical care provided for the poor) – are considered. This method may be compared with the use of only cash payments for the recipients of the Aid to Families with Dependent Children (AFDC) (Caudill and Mixon, 1993), because all the AFDC recipients are automatically eligible for Medicaid and categorically qualified for food stamps. Second, because of lack of data for the Consumer Price Index (CPI) across states, AFDC benefits are measured against per capita disposable income so that relative cost of living or living standard is taken into consideration. This methodology provides an alternative to the use of the CPI for major Metropolitan Statistical Areas (MSAs) to derive real AFDC payments across states (Caudill and Mixon, 1993). Third, the habit persistence model is applied to investigate how past AFDC participation would affect current AFDC participation or how the actual size of AFDC recipients adjusts to the desired level. Fourth, the weighted least squares (WLS) method is employed to correct for potential heteroscedasticity normally found in the cross sectional data. A number of socio-economic variables such as the educational level, the unemployment rate, and the divorce rate are considered as well.

The paper is organized in the following manner. The literature is briefly reviewed in the second section with an emphasis on AFDC participation. The model is described in the third section. Empirical results and hypothesis tests are presented and interpreted in the fourth section. A summary and concluding remarks are made in the last section.

II. *Literature Survey*

Based on the 1980 Census data for many MSAs, Cloutier and Loviscek (1989) found that AFDC families increase if the own benefit payment, the inter-urban benefit difference ratio, the unemployment rate, and median female annual earnings rise, and that poverty among female-headed families rises if a metropolitan area is adjacent to a lower benefit payment urban area.

Using the data from 1978 to 1983, Robins (1990) indicated that AFDC participation rates declined from 0.40 in 1978 to 0.32 in 1983. He attributed the decline to several reasons: decreases in real AFDC guarantee amount, changes in demographics, and increases in the effective AFDC

benefit reduction rate. However, rising unemployment rates and declining real child support collections are expected to raise the participation rate. His probit analysis also showed that blacks and separated households have higher AFDC participation, whereas increases in years of schooling, numbers of children and age will reduce AFDC participation.

Employing the 1980 data from the National Medical Care Utilization and Expenditure Survey, Blank (1989) found that AFDC participation is little affected by Medicaid. Winkler (1991) used the 1986 Current Population Survey and showed a similar finding that Medicaid does not affect AFDC participation and hours worked, but has a small negative impact on the decision to work.

Moffitt (1989) emphasized the importance of non-cash benefits such as food stamps in the determination of welfare participation. Moffitt and Wolfe (1992) studied welfare participation of female heads and developed an index for the family value of Medicaid benefits. The data came from the Survey of Income and Program Participation in 1984. They found strong evidence that Medicaid increases welfare participation and reduces labor supply [2]. The impact is greater with those expecting large medical expenditure. The negative impact of the availability and funding of private health insurance on AFDC participation is more than twice the positive effect of the Medicaid program. Other major findings showed that increases in age and education will reduce AFDC participation, whereas nonwhites have greater participation.

Gottschalk (1990) found that for whites and blacks, there is a high degree of intergenerational correlation of welfare participation. When parents were eligible for and participated in AFDC, their daughters had a greater probability to have early birth and become AFDC recipients [3]. Antel (1992) used young girls and their mothers as samples and found that the current welfare system stimulates the dependency of future generations and that a daughter's welfare dependency is expected to increase with her mother's welfare participation.

III. *The Model*

Based on previous studies and economic theory, the size of AFDC recipients can be expressed as:

[2] Note, however, that labor supply can also be reduced owing to illness or handicap which requires a larger amount of Medicaid.

[3] This intergenerational correlation can be explained by the difficulty of getting out of the poverty "trap".

$$AFDC_i = f(BEN_i, EDU_i, UNR_i, INC_i, DIV_i, AFDC_{i,t-1}) \quad (1)$$
$$\qquad\qquad +\quad -\quad +\quad ?\quad +\quad +$$

where

$AFDC$ = AFDC families as a percent of total families;
BEN = AFDC benefits as a percent of per capita disposable income;
EDU = percent of persons who are high school graduates or higher;
UNR = the unemployment rate;
INC = per capita disposable income;
DIV = the divorce rate;
i = an individual state.

The following three types of benefits (BEN) will be considered:

$CASH$ = cash payments;
$CASHFS$ = cash payments plus food stamps;
$BENALL$ = cash payments, food stamps and Medicaid benefits.

It is expected that $AFDC$ varies positively with BEN, UNR, and DIV, but negatively with EDU. As Bassi (1990) pointed out, there are voluntary and involuntary AFDC recipients. Increases in involuntary unemployment and the population that was eligible for AFDC caused AFDC recipients to rise during 1967-79. Thus, the unemployment rate is used to measure how difficult it is to find jobs in the labor maket.

As indicated by Gottschalk (1990) and Antel (1992), there is an intergenerational correlation of welfare participation between mothers and their daughters. To generalize their findings, this may suggest that AFDC recipients in the last period ($AFDC_{i,t-1}$) may affect current AFDC recipients ($AFDC_{it}$) due to the habit persistence model.

INC measures financial strength of the society to support welfare programs. Thus, a more affluent society is likely to support more AFDC recipients. On the other hand, INC also measures the degree of poverty. Hence, when INC rises, poverty declines, and AFDC recipients are expected to decrease. Because of the positive and negative impacts of INC on $AFDC$, the sign of INC is uncertain.

IV. *Empirical Results*

The sample consists of 49 states. The use of states as the sample is justified because federal and state governments share the expense of welfare

programs. Although data for AFDC recipients in 1991 are available, the year of 1990 is chosen because of lack of data for some of the independent variables in 1991. *AFDC* and welfare benefits came from the *Social Security Bulletin*, U.S. Social Security Administration. *EDU* was taken from the U.S. Census of Population, U.S. Bureau of the Census. *UNR* was obtained from the *Geographic Profile of Employment and Unemployment*, U.S. Bureau of Labor Statistics. *INC* came from the *Survey of Current Business*, U.S. Department of Commerce. *DIV* was collected from the *Vital Statistics of the United States*, U.S. National Center for Health Statistics.

In constructing the data for *CASHFS* and *BENALL*, a household size of three is assumed. As indicated earlier, all of the AFDC recipients are automatically eligible for Medicaid and are categorically qualified for food stamps. Because the data for food stamps provided for AFDC recipients are not available, it is assumed that all AFDC participants receive food stamps. This may be close to the conjecture that the percent of AFDC participants who actually receive food stamps is quite high.

An analysis of the data indicates that annual AFDC cash benefits per person varied from a low of $482.04 in Alabama to a high of $2,934.12 in Alaska. The amount of food stamps per person also ranged from $495.14 in California to $1,051.95 in Hawaii. The annual Medicaid benefit per capita differed from $1,354 in Mississippi to $5,423 in New Hampshire. Differences in these benefits are expected to influence AFDC participation. However, we need to note that there are some differences among these three benefits. AFDC cash payments provide the most flexible discretionary use, food stamps have restricted use, and the Medicaid program is utilized intensively or occasionally by AFDC participants, depending upon their health conditions. One of the reasons for the differences is due to the cost of living. However, the cost of living indexes are only compiled for major metropolitan areas, but not for individual states. Thus, AFDC benefits are expressed as a percent of per capita disposable income in order to tie benefits to the cost of living or living standard.

Estimated regressions and relevant statistics are presented in Table 1. Both regressions were estimated with the weighted least squares method assuming the multiplicative heteroscedasticity. In (A), all of the coefficients have the expected signs and are significant at the 1% level, except that the coefficient of *UNR* is significant at the 2.5% level. AFDC participation will decline if the *AFDC* monthly benefit/income ratio, the divorce rate, the unemployment rate, or per capita disposable income decreases and if the educational level increases. The habit persistence model is confirmed because the coefficient of $AFDC_{t-1}$ has a positive and significant sign.

TABLE 1

ESTIMATED REGRESSIONS FOR AFDC RECIPIENTS AND ITS DETERMINANTS: 1990

Variables	(A)	(B)	(C)
CASH	0.060**		
	(3.018)		
CASHFS		0.083*	
		(2.360)	
BENALL			0.081*
			(2.140)
EDU	−0.407**	−0.378**	−0.299**
	(−3.903)	(−3.411)	(−3.154)
UNR	0.046*	0.028	0.024
	(2.023)	(1.059)	(0.950)
INC	0.187**	0.225**	0.249**
	(4.786)	(5.429)	(5.631)
DIV	0.060**	0.063**	0.100**
	(2.839)	(2.796)	(3.413)
$AFDC_{t-1}$	0.913**	0.920**	0.951**
	(45.890)	(44.150)	(49.380)
INT	−0.197	−0.788	−1.532
	(−0.439)	(−2.068)	(−3.696)
R^2	0.984	0.984	0.983

INT is the intercept.
Figures in parentheses are t-ratios.
All variables are expressed in the logarithmic scale.
** means a 1% significance level.
* means a 2.5% significance level.

The adjustment coefficient is 0.087, suggesting that it takes quite a while for the actual AFDC recipients to adjust to the desired level. There are a number of reasons why this may happen. These may be called the recognition lag, the administrative lag, and the legislative lag. It may take a while for potentially eligible persons to understand welfare programs and to apply for the benefits. It is also time-consuming for government employees to process applications and to evaluate if applicants are eligible for welfare benefits. Sometimes, it may take years for the legislative branch to pass

welfare reform or changes, because a cut in welfare benefits would be politically unpopular among the poor.

In (B), AFDC cash payments plus food stamps (*CASHFS*) are treated as one variable. We find that its coefficient is significant at the 2.5% level and that the coefficient of *UNR* is insignificant. Other coefficients are significant at the 1% level. In (C), all of the three benefits (*BENALL*) are considered. Results are similar to those found in (B). Our findings are in contrast with Blank (1989) and Winkler (1991) who indicated that Medicaid is insignificant at the 5% level, but are consistent with Moffitt and Wolfe (1992) who emphasized that AFDC benefits should include cash, food stamps, and Medicaid. The difference between findings in this study and Moffit and Wolfe (1992) is that we regard all of the benefits as one package, whereas they treat individual benefits separately.

V. *Conclusions*

In this paper, the determinants of AFDC recipients across states have been examined. Six independent variables are considered in the regression analysis. We have found that increases in the educational level reduce AFDC recipients, whereas increases in monthly AFDC benefits, per capita income, the unemployment rate, and the divorce rate cause AFDC recipients to rise. The habit persistence model is also confirmed because the behavior of AFDC recipients in the past affects that of current AFDC recipients or because it takes more than one period for the actual size of AFDC recipients to adjust to the desired level.

There are several policy implications. In some states, AFDC benefits may be higher than in other states, thus creating an incentive for existing recipients to stay longer or for others to apply for the AFDC program. Second, AFDC cash payments, food stamps, and Medicaid are considered. No matter which measure of the benefits is used, results are consistent and show that an increase in AFDC benefits is expected to raise AFDC participation. Third, the government needs to emphasize education, reduce dropout rates, provide family counseling, and pursue full employment so that AFDC recipients may have adequate training and skills and a favorable environment to find jobs to become self-sufficient.

The paper has a number of limitations. Because the data for food stamps paid to AFDC recipients are not available, the assumption that all AFDC recipients receive food stamps may overestimate the actual value. Because of the use of state data, individual characters are not considered in

the regressions. Benefits received by AFDC recipients are not separated due to a high degree of multicollinearity.

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PERSISTENZA DELL'ABITUDINE, MISURE DEI BENEFICI E DETERMINANTI DELLA PARTECIPAZIONE ALL'ASSISTENZA SOCIALE

Questo articolo estende i lavori di Moffitt e Wolfe (1992), Blank (1989), Winkler (1991), Caudill e Mixon (1993) e altri ed esamina, per un campione di 49 stati nel 1990, l'impatto della partecipazione in passato all'assistenza sociale, di differenti misure dei benefici e di altre variabili socio-economiche sulla partecipazione all'assistenza sociale. I risultati sono un poco diversi da quelli ottenuti da Blank e Winkler. I risultati più importanti mostrano che esiste una persistenza dell'abitudine, che è opportuna una più ampia misura dei benefici (aiuti alle famiglie con minori) e che la partecipazione a questi aiuti diminuisce con l'aumento del livello di istruzione e del reddito personale procapite, e aumenta con più elevati tassi di divorzio.

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A NOTE ON ECONOMIC RATIONALITY IN ENVIRONMENTAL POLICY

by
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1. *Introduction*

The conventional academic literature on environmental economics is largely based upon the concept of externalities. As Wijkander (1985, p. 111) states: "Externalities can be conceived as unpriced by-products of (or inputs to) producer or consumer activities".

In the presence of environmental costs, conventional economic theory suggests that a rational solution to this problem may be to levy a tax equal to the costs generated by the negative external effects, see Pigou (1920), Bohm and Russel (1985), Baumol and Oates (1988), OECD (1989), Helm and Pearce (1990), Tietenberg (1990a, 1990b), and Andersen (1992).

Figure 1 visualises the effect of internalizing the external costs into the private production cost function. Production is reduced from Q 1 to Q 2, as a result of a shift in the supply curve. Alternatively, this conventional approach also allows for a subsidy to be allocated to the party suffering from the negative environmental effect or to the polluting actor in order to stimulate the use of a more environment friendly production technology.

Given the costs that are often associated with measuring actual external effects, economic rationality, in terms of welfare maximizing behaviour, suggests that the tax (T) (which is intended to internalize the external effect) should be equal for each unit of production, see Figure 2.

In other words, in practice it is mostly not possible to implement the

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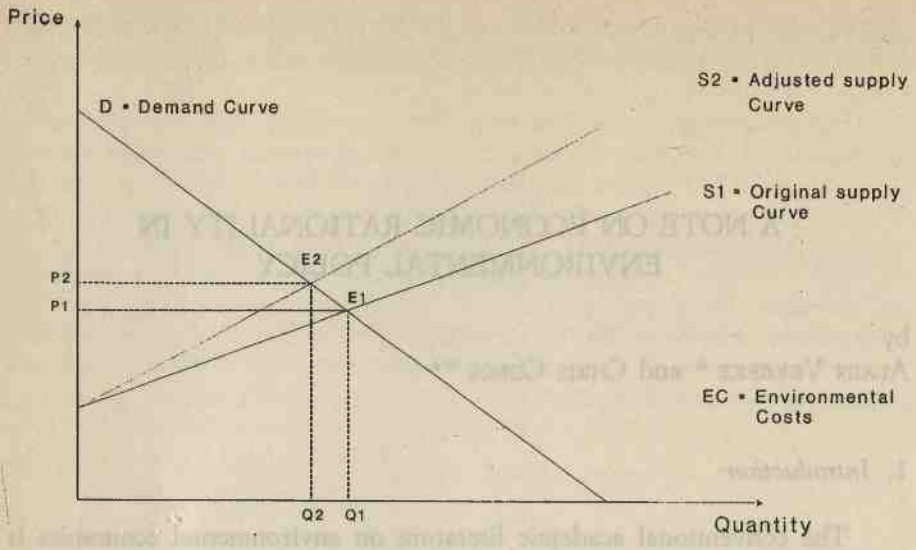

FIGURE 1: Internalization of external costs into the market mechanism

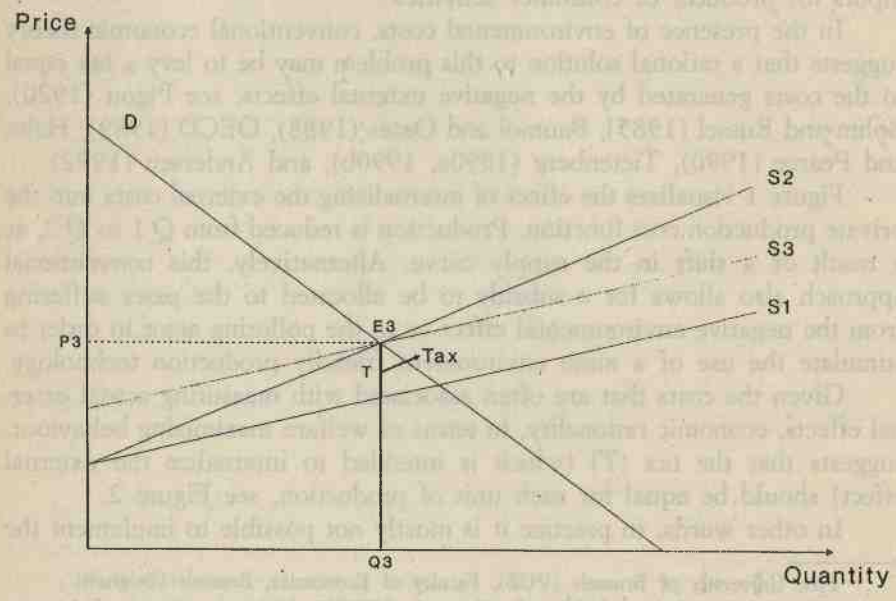

FIGURE 2: Pigou type taxation in the presence of environmental costs

"polluter pays"-principle in terms of levying a tax exactly equal to the marginal environmental costs associated with a marginal change in the level of production by a specific economic actor. For example, a uniform tax on the purchase of each unit of leaded gas does not take into account the technology of the car engine (which may lead to a higher or lower level of pollution), nor the place of pollution (such as a heavily congested and polluted city versus a non-congested and non-polluted country side). This implies that some economic actors will actually pay too much and others too little, because the only visible and easily measurable attribute of polluting behaviour in this case is the use of gas as an input. Similarly, taxes could be levied on the purchase or use of sport cars or cars with a large engine, given the expectation that drivers of such cars are intrinsically heavier polluters than drivers of family cars. In practice, some owners or users of the former category of cars may actually be very careful occasional drivers whereas some owners or users of the latter may be generators of much higher negative external effects in terms of noise, toxic emissions, etc.

In the simple cases mentioned above, the incorrect allocation of taxes to particular economic actors may not matter very much, as long as, overall, taxes compensate for the negative external effects associated with private road transportation. However, in the case of industrial pollution, various other elements may make environmental decision making by public policy makers much more complex. They include:

1. The possible contradiction between financial (tax income) and behavioural (reduction in polluting behaviour) public policy goals;

2. The possible absence of adequate information on the potential effectiveness of alternative public policy regulatory approaches and on the possible interaction among various measures;

3. The possible absence of perceived legitimacy of specific policies (impact on voting behaviour);

4. The possible absence of sufficient administrative capabilities to implement specific policies (low level of technical know-how in public agencies responsible for administering an environmental programme);

5. The absence of knowledge on the constraints faced by the managers and owners of firms confronted with the regulatory requirement to reduce pollution and/or pay environmental taxes. These constraints may be related to the firms' competitive position vis-à-vis foreign rivals subject to different regulations or to the lack of technological know-how that could reduce pollution.

The presence of the five elements above implies that the main public policy problem shifts from the simple "academic" measurement of the social

costs of pollution and the welfare maximizing choice of the best tool to internalize these social costs, toward a much more difficult set of questions to be solved by public policy makers. Here, we are confronted with a policy formation process in which multiple actors are involved and where uncertainty and complexity make the relatively easy "welfare maximizing how-to-do-it"-prescriptions on assessing environmental damage the equivalent of the first hundred meters of a marathon.

In fact, both the formation of environmental policy and the extent to which economic efficiency is actually achieved through such a policy can be largely described in terms of the concepts "bounded rationality" and "opportunism" as defined by Williamson (1975, 1985). Bounded rationality reflects the fact that economic actors are hampered in their decisions by inadequate or incomplete information. Instead of the intended rational action, a suboptimal decision is made based on incomplete information: the rationality of policy makers is "bounded". With bounded rationality, economic actors "experience limits in formulating and solving complex problems and in processing (receiving, storing, retrieving, transmitting) information", see Williamson (1975, 1981, p. 1545 and 1985) [1]. Opportunism refers to "self-interest seeking (with guile)", i.e. cheating behaviour resulting from information asymmetries, see Williamson (1981, p. 1545).

In other words, the properties of each environmental policy, including the mix of measures used, the administrative system set up to enforce them, the presence of sanctioning machanisms (penalties for firms that do not respect environmental regulations), the impact of the affected business firms on the policy process and outcome, etc., can all be translated in terms of the extent to which they help economizing on bounded rationality and alleviating problems of opportunism. A comparative institutional assessment of real world environmental policy alternatives will then allow to optimize an existing system: attributes that could reduce problems of bounded rationality and opportunism should be introduced, attributes that generate such problems or do not contribute to solving them should be replaced by others.

The rational choice of a specific environmental policy would then be a

[1] Although the concept of bounded rationality is credited to H. Simon, Williamson's analysis of this factor is somewhat different. In Simon's view, economic actors do not pursue maximization but try to obtain acceptable minima instead, see HODGSON (1993, p. 11). In contrast, Williamson's concept of bounded rationality refers to cost-minimizing, or welfare maximizing behaviour given a variety of information constraints. Williamson therefore does not share the view of the "behavioural school" and has obviously been more influenced by the neo-classical maximization assumption in his analysis.

choice guided by the willingness to reduce problems of bounded rationality and opportunism, through altering particular attributes of existing policies, taking into account specific public policy goals. This approach is used in the remainder of this paper, through an application to environmental policy in Belgium (Flanders area). In the next section, a new conceptual model is developed to assess the economic efficiency properties of alternative environmental policy measures. In the third section, the relevance of this model is discussed through a qualitative and quantitative analysis of the impact of existing and expected environmental policy measures in Belgium. In the fourth section, the results of in-depth interviews carried out with managers of 15 firms subject to the present economic regulation in Belgium are used to gain further insights into the efficiency properties of the existing environmental policy system and possible alternative approaches.

2. *Economic Efficiency of Environmental Policy*

At least four main sets of actors are involved in environmental policy aimed at regulating industrial pollution: politicians (who formulate policies), bureaucrats (public agencies responsible for the implementation of policies), firms (which are affected by environmental policy measures) and society at large (which should benefit from the environmental policy measures).

Important bounded rationality and opportunism problems may arise during the environmental policy formation process. As regards bounded rationality, politicians may not have adequate information concerning all the effects associated with implementing specific measures, neither from administering agencies nor from the affected business firms' point of view. In addition, they may also lack information as regards the extent to which specific policy measures will be considered as legitimate both by the actors benefiting from the measures (i.e., the voters) and the actors affected by these measures (i.e., the business firms engaged in polluting behaviour). This legitimacy-issue has important implications for the actual efficiency of environmental policy measures, as will be explained below. Fundamentally, the bounded rationality problem is related to a lack of information on the potential efficiency of specific measures as compared to other ones, assuming that no serious problems of legitimacy, administrative implementation or business level implementation occur.

Opportunism may also have a major impact on the efficiency of specific policy measures. Politicians may select particular policy measures, merely to pursue their own goals rather than societal goals. For example, purely

financial objectives may be pursued aimed at raising general income for government through environmental taxes. Alternatively, specific measures with a high public visibility may be introduced in order to increase votes, not to optimize pollution levels. Polluting firms and public agencies responsible for implementing environmental policy measures may also engage in cheating behaviour. For example, the former may attempt to disguise real pollution levels. The latter may engage in an insufficient or too rigid enforcement of environmental measures in the pursuit of their own goals, thereby even stimulating opportunistic behaviour by business firms.

Given the problems of bounded rationality and opportunism described above, economic rationality in environmental policy obviously entails the selection of policy measures that have a high potential effectiveness in terms of contributing to environmental policy goals, but also requires the design of a decision making structure (and process), which allows to economize on bounded rationality and prevent opportunistic behaviour of the various actors involved. A difficult issue is undoubtedly the problem of reducing the propensity of politicians to behave opportunistically. After all, it may be perfectly rational for them, not to pursue a reduction of excessive pollution levels but to levy environmental taxes for mere financing reasons. In other words, the actors responsible for the choice of an institutional framework, within which environmental policy measures will be applied, may actually make choices that are not optimal from an economic efficiency point of view. Here, politically efficient policy outcomes are preferred over outcomes that are efficient from an economic perspective. This practical problem for policy analysis, which is discussed in North (1981, 1990), will not be dealt with in this paper. We assume that politicians at least to some extent are driven by the intent to achieve outcomes that are efficient from an economic rather than a political point of view, in the realm of environmental policy. This view seems reasonable to the extent that the voters themselves often voice preferences in favour of environmental policy decisions that are efficient from an economic perspective. The main rational choice problem then becomes one of choosing an institutional setting with attributes that contribute as much as possible to environmental policy goals, through a reduction of bounded rationality and opportunism problems faced by politicians.

Baumol and Oates (1979, p. 232) established a classification of various environmental policy measures according to several criteria, but did not solve the problem of optimal institutional choice. Baumol and Oates used a classification of policy instruments according to eight criteria, i.e. (1) dependability, (2) permanence, (3) adaptability, (4) incentives for maximum

effort, (5) economy, (6) political attractiveness, (7) minimal interference with private decisions and (8) equity [2].

In our view, only four criteria are important to assess alternative structures for environmental policy from a comparative institutional point of view, namely:

1. Potential economic efficiency, which requires knowledge on the differential contribution of each possible regulatory system to public policy goals (in terms of either the "polluter pays"-principle or the goal of reducing pollution to a socially acceptable level), weighted against the implementation costs. Here, it is assumed that no problems of bounded rationality or opportunism exist in terms of social legitimacy (especially vis-à-vis polluting firms) of the regulatory system, the administrative implementation and the business level of implementation.

All criteria of Baumol and Oates (1979), except the last one could be viewed as components of this potential economic efficiency criterion.

2. The social legitimacy of the regulatory system, which is required to avoid opportunistic behaviour by firms. Specifically, social legitimacy will be absent if polluting firms perceive that the environmental taxes they pay to government are used for purposes unrelated to environmental policy. Institutional elements which may stimulate social legitimacy include transparent environmental tax income/expenditures accounts and tax exemptions for firms that engage in pollution reducing investments. This parameter includes the equity criterion of Baumol and Oates (1979).

3. The difficulties of administrative implementation, which may result from agency problems in bureaucratic organisation or from the lack

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[2] Baumol and Oates define the set of criteria more in detail as:

1. *dependability*: describes the reliability of the approach to achieve its objectives.

2. *permanence*: evaluates the effectiveness of the environmental program when it captures public interest and also when the attention of the media and the public weakens.

3. *adaptability* to economic growth: describes the possibility for the environmental program to be flexible enough to adapt to normal expansion in economic activities and population growth.

4. *incentives for maximum effort*: evaluates to what extent incentives are offered by the program to individuals or enterprises, to minimize environmental damage.

5. *economy*: investigates whether the program achieves its results at relatively low costs to society.

6. *political attractiveness*: evaluates the usefulness of the method for legislators and voters.

7. *minimal interference with private decisions*: answers the question whether the method prescribes exactly what to do or whether it offers a broad tange of choices consistent with the protection of the environment.

8. *equity*: suggests that the financial burden should be fairly divided between individuals and enterprises.

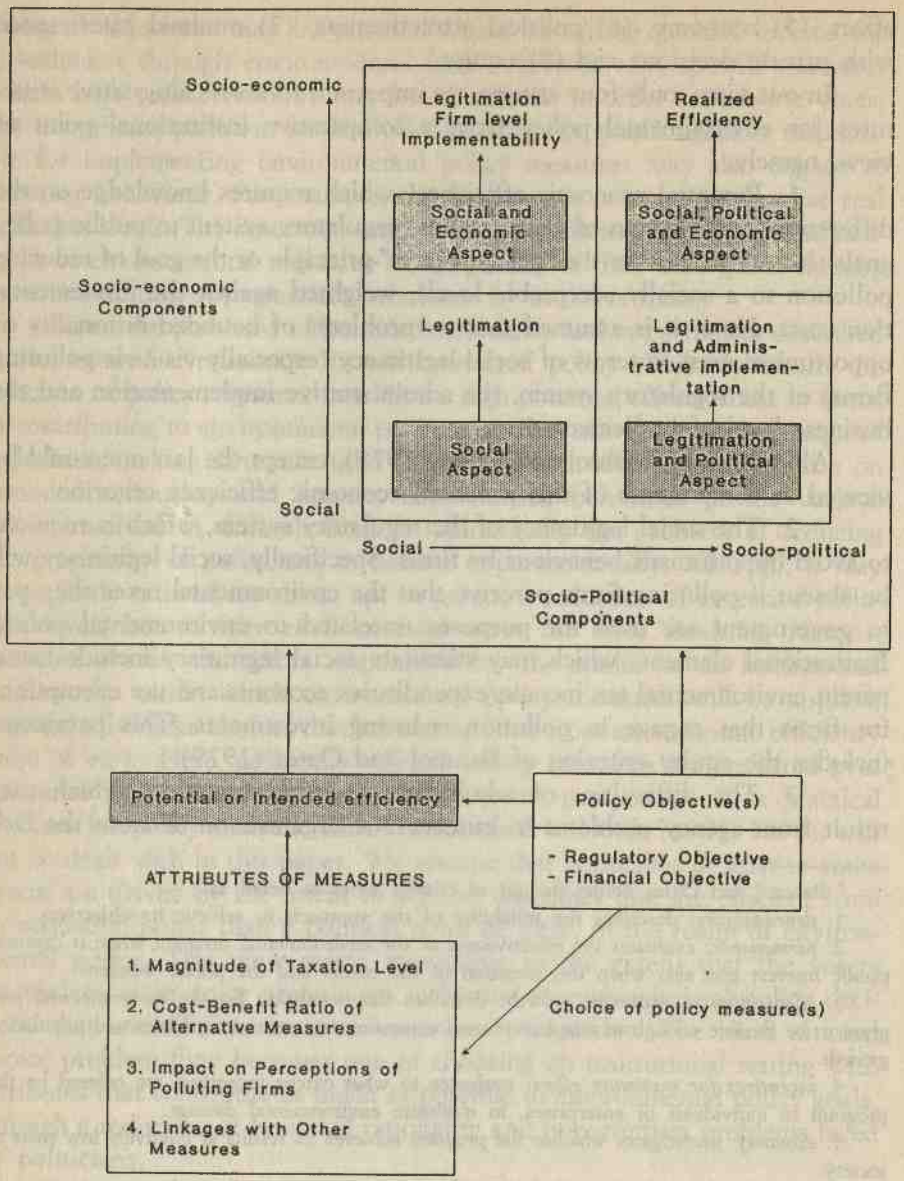

FIGURE 3: Efficiency analysis of environmental policy

of resources and capabilities to effectively implement specific measures.

4. The difficulties of implementation at the firm level, including financial and technological problems associated with implementing specific policies, as well as negative spill-overs on the affected firms' competitive position vis-à-vis international rivals subject to a different regulatory regime.

Figure 3 describes the required components for an efficient environmental policy as suggested above.

In the next section, a quantitative model is developed, which attempts to assess the economic efficiency of environmental taxes on industrial pollution in Belgium, with a focus on the issue of social legitimacy and problems of firm level implementation.

3. *Environmental Policy in Belgium - Flemish Region*

Environmental taxes on industrial pollution are widely regarded as environmental measures with a high potential economic efficiency, as suggested by a substantial body of economic literature and by a number of empirical studies [3].

In Belgium, environmental taxes are levied at the regional level. The present system of taxation on water pollution in the Flemish region was introduced in 1990 and mainly aims at reducing existing levels of water pollution. The income resulting from taxes on water pollution is allocated to the so-called MINA-fund (Fund for pollution prevention and restoration of nature and environment), and is used entirely for financing a variety of environmental policies.

Taxes on other (non-water) industrial pollution have existed since 1986. Here too, these taxes are intended to reduce polluting behaviour and to finance government policies in this area.

Given that the government's main policy goal is to reduce pollution levels through taxes on pollution which undoubtedly have a high potential efficiency, as compared to other types of instruments, the question arises as to the actual realized efficiency of these taxes, especially as regards their legitimacy perceived by firms and the extent to which they have led to a reduction of pollution as compared to the situation before the present taxation system was introduced.

A sample of 383 firms, responsible for more than 80% of industrial water pollution and a sample of 448 firms representing more than 85% of

[3] See e.g. DEWEES (1983), BAUMOL and OATES (1988) and HAHN (1989).

other (non water) industrial pollution in the Flemish region were selected for an investigation about the legitimacy and business level implementation effects of environmental taxes (see S'Jegers et al., 1993).

The model used to measure the effectiveness of environmental taxes was based on existing empirical studies, i.e. Bressers (1983 and 1988) and Schuurman (1988). These two authors consider the system of environmental taxation of polluted water in the Netherlands as a linear function. The different relevant variables therefore can be estimated by means of multiple linear regression.

The original analysis of Bressers was based on a survey of 40 regional Dutch Sewage Boards, that are responsible for monitoring water quality in the Netherlands.

Schuurman investigated the evolution of pollution levels, based on a survey of 104 heavily polluting industrial companies. The results of both authors indicate that the regulatory effect of Dutch water charges in the past was considerable.

The responses to our survey lead to the application of quantitative models to 128 firms for water pollution (for the period 1990-1992) and 63 firms for other (non-water related) pollution (period 1989-1992), that had correctly and completely filled in a questionnaire on environmental policy.

After a general identification of the firm, company specific pollution data had to be supplied. More specifically, the behavioural analysis focused on the actions taken to reduce pollution and the implementation problems associated with these actions. A number of questions were also asked on the possible impact of environmental taxation on the firm's (international) competitive position.

An analysis of the responses to the questionnaire led to the conclusion that environmental taxes in the Flemish region at present do not have any positive impact on pollution reduction. This result was confirmed by empirical models (case studies on polluted water and non-water related pollution). These models are shown below.

In the case of water pollution, the following equation was determined by multiple linear regression (standard deviations are indicated between brackets):

$$\underset{}{REPOL} = -\underset{(528.28)}{340.85} + \underset{(34.89)}{165.77}\, LT + \underset{(5.48\ 10^{-6})}{5.25\ 10^{-5}}\, AEC + \underset{(69.92)}{47.51}\, REPROD$$

with: *REPOL* = relative evolution of pollution levels

LT = level of taxation

AEC = mean elimination- or treatment costs

$REPROD$ = relative evolution of production.

These variables can be defined in detail as:

$$REPOL = \frac{\text{pollution volume year } x - \text{pollution volume year } (x - n)}{\text{pollution volume year } (x - n)}$$

$$LT = \frac{\text{average volume of pollution} \cdot \text{tariff}}{\text{average production value}} = \frac{\text{average level of taxation}}{\text{average production value}}$$

AEC = average elimination costs, when eliminating industrial pollution by entrepreneurial in-house management

$$REPROD = \left[\frac{\text{production value year } x - \text{production value year } (x - n)}{\text{production value year } (x - n)} \right] + 1$$

After carrying out a multiple regression analysis on the survey-data, multiple R attains 0.68 and R^2 0.46. This result implies that approximately 50% of the variation in pollution levels is described by the chosen variables.

If a stepwise-regression is carried out, only the level of taxation and the mean costs of elimination are significant. In this case R^2 attains 0.46 and the multiple R is 0.68.

In the equation it is remarkable, and even surprising, that the taxation level parameter has a positive sign rather than a negative one which seems to imply that higher levels of taxation are correlated with higher levels of relative pollution.

In the case of non-water pollution, the equation can be determined as follows:

$$\begin{matrix} REPOL = & -0.795 & +3.699\,LT & +1.056\,10^{-10}\,AEC & -0.209\,REPROD \\ & (4.055) & (0.456) & (5.079\,10^{-8}) & (1.154) \end{matrix}$$

The multiple R attains 0.72, whereas R^2 is 0.52. If a stepwise multiple regression is carried out, only the level of taxation remains a significant variable. Here too, higher taxation levels would appear to be associated with increases in relative pollution levels.

A summary of the different variables in each equation, t-statistics, R^2, standard deviations and the results of the Durbin-Watson test are provided in Table 1.

Hence, in the Flemish region of Belgium, it can be observed that the

TABLE 1 : SUMMARY TABLE

Water pollution

Variables	B	SE	T	Signif. T
LT	165.77	34.89	4.751	0.000 (*)
AEC	$5.25\ 10^{-5}$	$5.48\ 10^{-6}$	9.591	0.000 (*)
REPROD	47.51	69.92	0.679	0.498
Constant	-340.85	528.28	-0.645	0.520

(*) : variables remaining significant after regression-analysis

Multiple R	:	0.68
R^2	:	0.46
F	:	35.9
Signif. F	:	0.00
D-W test	:	2.02

Non-water pollution

Variables	B	SE	T	Signif. T
LT	3.67	0.46	8.043	0.000 (*)
AEC	$1.06\ 10^{-10}$	$5.08\ 10^{-8}$	0.002	0.998
REPROD	-0.21	1.15	-0.181	0.857
Constant	-0.79	4.06	-0.196	0.845

(*) : variables remaining significant after regression-analysis

Multiple R	:	0.72
R^2	:	0.52
F	:	21.7
Signif. F	:	0.00
D-W test	:	1.98

assumption of high tax-rates directly resulting in a reduction of pollution is unsupported by empirical evidence.

In 1990, taxation levels were increased substantially (for example the charges for a number of sectors were doubled or even tripled). Nevertheless, an analysis of the data for the 1990-1993 period indicated that no substan-

tial differences existed between pollution figures prior to 1990 and those occurring after 1990.

The absence of the expected behavioural impact of environmental taxes in terms of reduction of polluting behaviour could be partly explained by the time required to implement pollution reduction strategies and by a level of taxation which could be too low to induce changes in behaviour. However, the questionnaire also contained questions regarding future behaviour, more specifically on expected changes in pollution levels (less than 25%, between 25 and 50%, between 50 and 75% and between 75 and 100%) in the case of tax increases with 100% and 500%. A wide majority of firms did not even provide an answer to these questions, thus indicating that the present system of environmental taxes is not perceived as a legitimate instrument to alter pollution levels [4]. Firms do not perceive the present system as one meant to create a switch from polluting to non-polluting behaviour but they consider it primarily as a tool to raise funds for government. In fact, uncertainty about the evolution of the level of environmental taxes was even perceived as a factor hindering investments in polluting reduction by 46% of the firms in the case of water pollution and 34% in the case of non-water pollution.

The question then arises what changes in government policy could be introduced in order to improve the firm level impact of environmental policy. It is clear that government was rational in terms of selecting a policy instrument with a superior potential efficiency as compared to direct regulation (setting of maximum pollution levels), but somehow it is faced with a major information problem, given the absence of realized efficiency as regards actual levels of reduction in pollution. The problem of opportunism by business firms appears to have been an issue of lesser importance, as even in-depth interviews conducted with managers of the affected firms did not indicate that cheating behaviour took place on a large scale. For example, in the case of water pollution, inspections by the public agency responsible for measuring pollution levels often take place unannounced so that the possibility of artificially reducing pollution levels during the short periods of official measurement (through shifts in the product mix from heavily polluting products to products with a lower pollution level) is reduced. In this context, it should be recognized, however, that if the present system was altered to allow for extensive self regulation by firms, an increase in levels of opportunistic behaviour could be expected.

[4] These results should obviously be interpreted with caution because firm managers have an incentive to state that future behaviour will not be altered by taxes in order to obtain tax reductions.

In our view, the bounded rationality problems faced by the government in the area of creating legitimacy of environmental taxes can be related to an insufficient understanding of the necessity to transfer information to firms on the actual objective of levying environmental taxes. It may also be related to a lack of understanding of the present perception by business firms that the private sector is not sufficiently involved in the design of environmental programmes and that environmental taxes are not spent effectively by the government.

A rational government, interested in programme outcomes rather than in the selection of policy tools which are allegedly superior as compared to other tools, should develop programme attributes that can alleviate such problems. In fact, dual information asymmetries need to be eliminated. The government needs to receive information on how to improve the programme's legitimacy in the eyes of the affected business firms, whereas these firms need to be informed more extensively on the purposes of the environmental policy and planned changes in this policy.

A major problem may still arise in the realm of firm level implementation, even if environmental policy measures are viewed as legitimate. Economic efficiency can only be achieved if technological possibilities exist to reduce pollution levels or if no negative spill-overs result from taxation (a loss of value added in the domestic economy, because of a negative impact on a domestic operator's competitive position vis-à-vis international rivals or foreign operations of the same firm).

These issues are dealt with in more depth in the next section.

4. *Solving Bounded Rationality Problems in Environmental Policy*

In-depth interviews were held with managers of fifteen companies, all large polluting companies in the Flemish region of Belgium, to ask their opinion on possible problems of legitimacy and firm-level implementation of environmental policy [5].

Each of these firms agreed with the "the polluter should pay"-principle, indicating that the concept of environmental taxes in itself is viewed as legitimate. However, the legitimacy of the actual environmental taxation

[5] These fifteen firms are Bayer and Rhône-Poulenc (chemical sector), UCO Sportswear, Imperial Tufting and Sofinal (textiles), VPK Oudegem (paper), Union Minière (nonferrous metals), Union Belgium, General Biscuits, Tiense Suikerraffinaderij and Continental Foods (food processing), Volvo Cars and Trucks Europe (automobiles), Animalia (agriculture) and Electrabel (electricity).

system was considered to be very low, because the government at present does not permit sufficient input in policy formation from the affected business firms. In fact, fourteen of the fifteen firms argued that the input from the business community should be drastically increased.

First, firms should be allowed to submit individual files on the expected impact of planned changes in the environmental taxation system, so that the government would at least be informed on the firm level impact of specific policy measures. Rational politicians should thus find out how planned policy changes are perceived by firms. This information would not necessarily be valuable in terms of altering proposed government measures, but would create legitimacy in the eyes of firms, because the government *would know in advance* what the impact of specific measures would be.

However, in no case should the submission of individual company files automatically lead to an exemption from the environmental taxes, i.e. an implicit subsidy, benefiting the firm facing severe competition. The cost of such a subsidy would obviously be borne by society at large. The submitted information should simply provide in-depth knowledge to public policy makers on the firm-level implications of (intended) policy actions.

Second, politicians should also recognize that managers and owners of firms, faced with bounded rationality problems themselves, have a preference for uncertainty reduction through knowledge on the future evolution of environmental policy, such as the magnitude of environmental taxes. Hence, the development and publication of a long term plan on environmental policy would also increase the legitimacy of such a plan because of uncertainty reduction for business firms.

Third, the legitimacy of environmental policy can be increased by the introduction of a public monitoring capability that would assess environmental policies and more specifically the level of environmental taxes in important trading partners of Belgium (i.e. France, Germany, the Netherlands) so that measures taken in the Flemish region could always be compared with measures abroad.

This last issue is also related to the problems of firm level implementation, as visualized in Figure 4 on the conceptual basis for a differentiated taxation system. Quadrant 1 of Figure 4 reflects the existence of firms which do not have access to technological capabilities that would allow to reduce pollution levels. In addition, environmental taxes have an important negative impact on their competitive position. Although the government should not necessarily alter its environmental policies to accommodate the firms in this quadrant, it should at least recognize that the implementation of the "polluter should pay"-principle may lead to negative spill-over effects

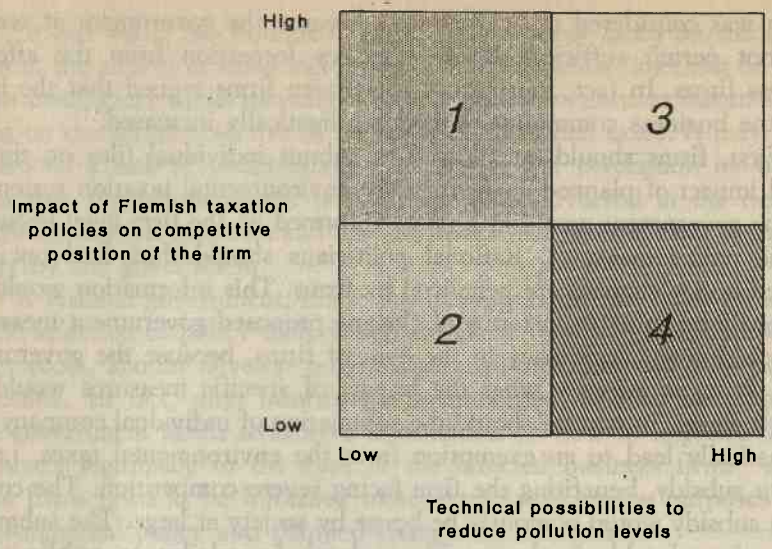

FIGURE 4: Conceptual basis for a differentiated environmental taxation system

in terms of losses of value added because of the unfavourable effects on the affected firms' competitive position. Here, economic efficiency considerations could suggest that the taxation system should be adapted to the system prevailing in representative trading partners or nations.

In other words, the government could reduce its own bounded rationality problems on the possible negative effects of environmental taxes and thus on the overall efficiency to be expected of such taxes by, e.g., introducing a "ceiling" on taxes, in accordance with the strongest taxation levels prevailing in other relevant nations.

Firms in the second quadrant cannot change their pollution levels either, but do not undergo any major negative impact of the taxation levels on their competitive position. Here, the government should find out what

part of the total population of firms fits into this quadrant where economic efficiency may be achieved in terms of the "polluter should pay"-principle, but not in terms of reducing existing pollution levels.

Companies in the third quadrant have access to important pollution reduction capabilities, but may undergo a major negative impact on their competitive position as a result of environmental taxes. Although the level of reduction of environmental pollution may in principle be very high, given that firms in this quadrant can be expected to explicitly weigh the payment of taxes against the costs of pollution reducing investments, the comment made above on the requirement for a "ceiling" is valid here too.

Finally, the fourth quadrant reflects the presence of firms with ample possibilities of reducing pollution and which will not be negatively affected by environmental taxes in terms of competitive position. Here again, the "polluter should pay"-principle may be successfully implemented, but no substantial investments in pollution reduction should be expected.

The observations made above demonstrate that it is very important for the government to develop insights into firm level implementation problems resulting from an environmental policy based on pollution taxes.

First, the government should become informed on the possible negative effects of such taxes on the affected firms' competitive position. These negative effects can be largely avoided by placing a relevant "ceiling" on environmental taxes. The bounded rationality problems faced by the government in this area refer to acquiring sufficient information to determine what an adequate ceiling is.

Second, the government should recognize that for a substantial number of firms, a reduction of pollution levels is not a viable, technical possibility, so that economic efficiency, if defined in terms of an actual reduction of pollution levels, may not be achieved.

5. *Conclusion*

The analysis above has suggested that economic rationality in environmental policy requires a recognition of the fact that policy measures are not taken in a social vacuum: they are introduced within a complex network of social, political and economic interactions among different sets of actors. It could be argued that politicians face important costs when attempting to gather information that would lead to more efficient outcomes of environmental policy. However, given these informational costs, politicians are still able to order their alternative goals, values, tastes and strategies and choose

from available alternatives to maximize their utility. If it is then observed that outcomes are not consistent with a present goal (environmental taxes do not lead to a substantial decrease of pollution), this could be explained as the logical result of a difference between substantive rationality or posited preferences, as found in official policy documents or policy statements and procedural rationality or revealed preferences, in which neither goals nor outcomes are specified in advance (see Riker, 1990).

If procedural rationality is assumed, no inconsistency occurs, as the choice of a particular set of environmental policy measures and all the structural attributes associated with this policy reflect preferences which can be inferred backward from the outcomes. In our view this is a simplistic approach of reality. One can undoubtedly find examples of policies and policy outcomes which are inconsistent with substantive rationality, merely because of absolute information costs or the dissimulation of goals by public policy makers. However, there are undoubtedly just as many examples of cases where public policy makers actually do have a preference for more efficient outcomes, but need to learn about the institutional requirements to achieve a higher economic efficiency. For example, if public policy makers can be taught (at a very low cost, given that information is a public good) that outcomes of existing environmental policies can be greatly improved through a focus on solving bounded rationality and opportunism problems in the areas of legitimacy, administrative implementation and firm level implementation, could it then not be argued that politicians who use this learning in practice are more substantively rational than those who do not? Substantive economic rationality is not just a matter of choosing policy instruments such as taxes (as opposed to minimum norms to be respected) because economic theory would suggest the superiority of these instruments and empirical studies would have demonstrated their success abroad. Making a public policy process and structure consistent with policy goals, by explicitly assessing the properties of alternative attributes in terms of their contribution to overcoming problems of bounded rationality and opportunism appears to be the rational road to follow.

A final important question is then whether politicians who are able to improve the outcomes of environmental policy will necessarily be rewarded in terms of re-election. After all, they contributed to the provision of an important public good.

First, it should be recognized that ideological views transmitted through the media could provide distorted information to the public at large on the actual efficiency outcomes of environmental policy, but such views will mostly not dominate if clear cause-effect relationships between specific

policies and outcomes exist. In this case, the introduction of more desirable public policy attributes meant to ameliorate bounded rationality and opportunism problems, should also improve knowledge about cause-effect relationships in environmental policy.

Second, the major problem faced by politicians providing public goods such as a cleaner environment, is that the value of these public goods cannot be measured in a straightforward, unambiguous fashion. In other words, it is difficult for politicians to market the efficiency of their policies toward the public at large, if this efficiency is difficult to measure.

Third, in the area of environmental policy, the government has a monopoly in establishing regulatory measures meant to reduce pollution. Hence, voters have no way of knowing how efficient a policy actually is. Environmental policies abroad do not necessarily constitute a good benchmark for efficiency comparisons given obvious differences in social, political and economic settings. This bounded rationality problem faced by politicians on how voters will react to specific environmental policies, given the information (bounded rationality) problems faced by the voters themselves, perhaps also merits an investigation on how to set up information disseminating devices to correctly inform the public on the actual economic efficiency of environmental policy. After all, politicians interested in substantively rational environmental policies would not be rational if they did not have a preference for the transfer of correct information to voters on the improvements achieved in the outcomes of environmental policy.

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NOTA SULLA RAZIONALITÀ ECONOMICA NELLA POLITICA AMBIENTALE

La letteratura convenzionale sull'economia ambientale suggerisce che si impongano tasse nel caso di costi ambientali e che queste tasse costituiscano lo strumento ottimale per realizzare il principio « chi inquina paghi ». Questo articolo mostra che molti altri elementi determinano l'efficacia della politica ambientale. In particolare vengono identificati quattro elementi che influenzano la reale efficacia della politica ambientale da un punto di vista istituzionale comparato. Inoltre, in base allo studio di un caso di imposte ambientali in Belgio, è stato costruito uno schema concettuale per un sistema di tassazione ambientale differenziato.

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A NOTE ON SPATIAL MONOPOLY

by
LUCA LAMBERTINI *

1. *Introduction*

The literature tackling the issue of horizontal differentiation stems from Hotelling's duopoly (1929), in which the hypothesis of linear transportation costs led to the so called *minimum differentiation principle*; the Bertrand paradox implicit in this result was given a solution by assuming quadratic transportation costs (D'Aspremont, Gabszewicz and Thisse, 1979). The aim of this short note is to investigate the behaviour of a monopolist in a horizontally differentiated market, i.e., to identify both her optimal location choice and her optimal pricing rule in the standard quadratic transportation cost framework, in the absence of any entry threat and assuming that she can open at most two stores.

2. *The Model*

Our starting point is the model of horizontal differentiation adopted by D'Aspremont et al. (1979). The monopolist initially faces the perspective of opening two stores, selling the same physical good in both. Assume consumers be uniformly distributed along an interval that, without loss of generality, can be assumed of length 1 (a "linear city", or Hotelling's beach), with total density equal to 1. Consumers have unit demands, and consumption yields a positive constant gross surplus s; then each consumer buys if and only if the following condition is satisfied:

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$$U = s - tx^2 - p_i \geq 0, \qquad 0 \leq x \leq 1, \qquad t > 0, \qquad i = 1, 2 \quad (1)$$

i.e., if the net utility derived from consumption is non-negative; tx^2 is the transportation cost incurred by a consumer living at distance x from store i; p_i is the price charged by the monopolist for the good being sold at store i. Store 1 is located at point $a \geq 0$ and store 2 at point $1 - b \geq a$.

Assume first that the gross surplus s is large enough and the trasportation cost rate t small enough for the market to be completely served by a single store monopolist. The demand functions for each of the two goods (or stores) are then

$$y_1 = a + \frac{1 - a - b}{2} + \frac{p_2 - p_1}{2t(1 - a - b)} \quad (2)$$

$$y_2 = 1 - y_1 = b + \frac{1 - a - b}{2} + \frac{p_1 - p_2}{2t(1 - a - b)} \quad (3)$$

respectively, for $a < 1 - b$. Functions (2) and (3) are not determined for $a = 1 - b$; in such a case, though, total demand may be provisionally thought as being equal to one. Unit production costs are assumed to be constant and can be normalized to zero without loss of generality. In the absence of entry threat, the objective of the monopolist is then [1]

$$\max_{a, b, p_{1,2}} \pi^M = p_1 y_1 + p_2 y_2 \qquad \text{if} \qquad a < 1 - b \quad (4)$$

$$\max_{p} \pi^M = p \qquad \text{if} \qquad a = 1 - b \quad (4')$$

As can be verified by inspection of the first order conditions, the maximum problem defined by (4-4') has no inner solution, whereas, since the objective function is upper hemi-continuous, it has a border solution along $a = 1 - b$. This amounts to saying that the monopolist is indifferent between differentiating or not, so that she may build up a single store. As pointed out by Tirole (1988, p. 282), a social planner would choose $a = b = 1/4$, since she aims at minimizing the trasportation cost incurred by consumers. Then, as a first conclusion, we may say that the product variety offered by a single store private monopolist is clearly socially suboptimal. The opposite conclusion holds for a duopoly, as it is well known (D'Aspremont, Gabszewicz and Thisse, 1979; Neven, 1985; Economides, 1986).

[1] The analysis of the monopolist's behaviour when further entries are considered is in Bonanno (1987) and Harter (1993).

Yet, the objective function (4′) is everywhere increasing in p; moreover, it doesn't convey any information on the optimal location. Consequently, in order to identify an economically meaningful solution, we must resort to an alternative formulation, tackling both the case of full coverage and that of partial coverage of the market. Let us simply denote the location by a; obviously, given the symmetry of the problem, we imagine $0 \leq a \leq \frac{1}{2}$. Since condition (1) must be satisfied, the highest price the monopolist can charge is

$$p^M = s - tx^2, \Rightarrow x \leq \sqrt{\frac{s}{t}} \tag{5}$$

while the profit function is

$$\pi^M = (s - tx^2)\, y \tag{6}$$

Notice that both a price-effect and a quantity-effect are present, of opposite sign. The demand function can be defined as $y = f(x)$, with

$$f(x) = 2x \;\forall x \in [0, a] \tag{7}$$

$$f(x) = x + a \;\forall\; x \in [a, 1 - a] \tag{8}$$

$$f(x) = 1 \,\forall x \in [1 - a, 1] \tag{9}$$

When demand is defined as in (8), the monopolist is better off setting $a = x$, for a given price, so that we can confine ourselves to the demand functions described by (7) and (9). Furthermore, under both full and partial market coverage, intuition suggests that in $a = 1/2$ the monopolist is not worse off than in any other location. We shall now first show this under partial market coverage.

3. *Partial Market Coverage*

Let us now assume that the relative size of s and t is such that if there exists a single store, the market is being only partially served. The monopolist's objective function is then defined as follows:

$$\max_x \pi^M = (s - tx^2)\, 2x, \;\forall x \in [0, a] \tag{10}$$

i.e., the maximum problem faced by the monopolist consists in choosing the

marginal consumer, living at distance x from the store, so as to maximize profits. The first order condition w.r.t. x is

$$\frac{\delta \pi^M}{\delta x} = 2s - 6tx^2 = 0 \tag{11}$$

yielding $x = \sqrt{\frac{s}{3t}}$ as a solution. Provided that $x \in [0, 1/2[$, this implies $s < \frac{3}{4}t$[2]. The equilibrium price is $p = \frac{2}{3}s$, while profit amounts to $\pi^M = \frac{4}{3}s\sqrt{\frac{s}{3t}}$. Since the marginal consumer lives at $x = \sqrt{\frac{s}{3t}}$ away from the store, a is not necessarily being set equal to 1/2, and we can formulate the monopolist's optimal price-and-location rule as follows: "if $s \in]0, \frac{3}{4}t[$, choose $x = \sqrt{\frac{s}{3t}}$ and $p = \frac{2}{3}s$; then, set $a \in \left[\sqrt{\frac{s}{3t}}, 1 - \sqrt{\frac{s}{3t}}\right]$".

Provided that some consumers are not served, the monopolist has an incentive towards product (or store) proliferation. Assume she sets up a second store. As long as s is so low that the monopolist can behave as if the two stores were operating in different markets, i.e., if $s < \frac{3}{16}t$ and $x < 1/4$, we simply observe a replication of the problem above, leading to analogous conclusions. The case in which two stores are sufficient for the market to be completely served is tackled in the next section.

4. *Full Market Coverage*

If $s \geq \frac{3}{4}t$, all consumers are served by a single store and the monopolist's objective is

$$\max_x \pi^M = s - tx^2 \ \forall \ x \in [1 - a, 1] \tag{12}$$

[2] This is written as a strict inequality, since the market is not covered by assumption. See Section 4.

The first derivative of (12) w.r.t. x is always negative over the relevant interval. This happens because the quantity-effect dries up, while the price-effect is negative. This entails that it is efficient to set $a = x = 1/2$, while the equilibrium values of price and profits coincide, being $p = \pi^M = s - t/4$. The optional price-and-location rule for the single store monopolist is now "if $s \geq \frac{3}{4}t$, choose $x = \frac{1}{2}$ and $p = s - \frac{t}{4}$; then, set $a = x$".

Otherwise, if $s \in \left[\frac{3}{16}t, \frac{3}{4}t\right[$, the monopolist can serve all consumers by opening a second store. The maximum problem leads to a replication of what we have just been through, so that the optimal locations are in 1/4 and 3/4 and $x = 1/4$ [3].

5. *Conclusions*

We tried to describe the optimal behaviour of a monopolist operating in a horizontally differentiated market. The outcome seems to be well summarized by the rule *do not differentiate*, unless the market can only be covered with more than one store (or product). Furthermore, the optimal location, as well as the optimal pricing rule, depends on the relative size of the parameters defining consumer surplus and trasportation cost. The incentive to differentiate arises when the former is sufficiently lower than the latter.

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[3] Notice that these would also be the socially efficient locations. The last perspective can be easily extended to any number n of stores, yielding as the generic optimal location $a_i = (2i - 1)/(2n)$. See also BONANNO (1987), where $s/t \geq 3/4$ throughout the paper and product proliferation is considered as a barrier to entry.

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NOTA SUL MONOPOLIO SPAZIALE

Lo scopo di questa breve nota è quello di analizzare il comportamento di un monopolista operante in un mercato per prodotti differenziati orizzontalmente. Se il surplus lordo unitario di ciascun consumatore è abbastanza alto da far sì che il mercato sia completamente servito da un unico punto di vendita, il monopolista è indifferente tra differenziare oppure no. Altrimenti, la scelta del numero di prodotti così come la loro collocazione spaziale e il loro prezzo dipendono dalla dimensione relativa del surplus lordo e del costo di trasporto.

RECENSIONI

TOTOLA VACCARI M.G.: *La dimensione entropica dello sviluppo economico*, 1994, Padova, Cedam, pp. V-161, L. 20.000.

Il volume di Maria Grazia Totola Vaccari è il risultato di una fertile ricerca che l'autrice sta svolgendo da diversi anni nel campo dell'economia ambientale e delle conseguenti implicazioni con lo sviluppo economico.

La crisi del rapporto uomo-ambiente nel popperiano « mondo 3 », il mondo della cultura e dei prodotti della mente umana (p. 33), ben delineata nel primo Capitolo, richiede un consapevole mutamento nella nostra visione dei problemi dello sviluppo economico. Si impone il passaggio da un approccio riduttivista e positivista, che ancora caratterizza la teoria economica dominante, ad una concezione più sistemica, « olista » e meno meccanicistica. Totola Vaccari, nello svolgimento del saggio, rimane fedele a questo faticoso proponimento metodologico, enunciato nel secondo capitolo, offrendoci una visione rigorosa e, nello stesso tempo, realmente interdisciplinare (economica, ecologica, politica, etica e biologica), dei legami tra sviluppo economico e crisi ambientale, dimostrando che non sempre « ogni buon economista debba essere sufficientemente acuto per comprendere le astratte ramificazioni della teoria neoclassica e sufficientemente ottuso per prestarvi fede » (Kay N.M., *The Emergent Firm: Knowledge, Ignorance and Surprise in Economic Organisation*, Macmillan, Londra, 1984, p. 188, cit. in Hodgson G., *Economia e istituzioni*, Otium Edizioni, Ancona, 1991).

Dopo aver definito il significato fisico dell'entropia (capitolo terzo), l'autrice ripercorre criticamente, con una sintesi efficace, l'utilizzo di questa categoria all'interno dell'analisi economica. Partendo dal contributo fondamentale di Georgescu-Roegen e di Boulding, ci introduce al dibattito sviluppatosi in letteratura negli anni '70 e '80 tra gli studiosi che hanno accolto la concezione del processo economico di Georgescu-Roegen, e ne hanno tratto le debite conseguenze in tema di sviluppo economico, quali Commoner, Daly, Schumacher, Perrings, e la nutrita schiera di coloro che, invece, hanno difeso l'impostazione teorica tradizionale, come Solow, Kay, Mirrlees, Herfindahl, Kneese e Rosenberg.

Da questa rassegna, emerge chiaramente come gli economisti impegnati nello studio dei problemi ambientali possano trovare preziosi suggerimenti negli scritti dei pensatori del passato. Il riferimento al pensiero fisiocratico, in molte pagine della moderna bioeconomia, è a tutti noto. La riscoperta dell'agricoltura, come convertitore energetico, è un'eredità importante di quella scuola di pensiero. Anche nell'ultima generazione di esperti ambientali, si riscontra questo ritorno alle intuizioni di economisti del passato per andare oltre la razionalità della teoria economica moderna.

Daly, uno degli autori più interessanti sul cui contributo l'autrice si sofferma nell'ultima parte del saggio, integra brillantemente nell'analisi milliana (della quale accoglie la preferenza per lo stato stazionario per motivi di ordine essenzialmente etico) la concezione del nostro

pianeta come un sistema termodinamico chiuso. Un aspetto stimolante nell'opera di Daly, sviluppato nel volume *Steady-State Economics* del 1991 e in altri scritti precedenti, è la revisione del concetto di efficienza in un'economia stazionaria, considerando l'azione delle leggi della termodinamica. Tale autore, proprio come J.S. Mill, è convinto che sia necessario per l'umanità giungere allo stato stazionario prima che questo le sia imposto. Nelle parole di Daly la stazionarietà dello sviluppo « non implica un *throughput*, costante, né una tecnologia congelata, né tanto meno assicura una vita eterna al sistema economico », ma rappresenta piuttosto una strategia saggia per il nostro pianeta, che « gli permetta di morire di vecchiaia e non di cancro generato da mania della crescita » (p. 123). Ciò sarà possibile unicamente sollecitando una crescita morale degli individui al fine di renderli più responsabili (Jonas). L'uomo dovrà sempre più riconoscersi come « cittadino biotico », gravato di una responsabilità che si estende alle diverse componenti del sistema che sono state per tradizione trascurate perché ritenute moralmente « neutre », o « inferiori », sotto il profilo ontologico (p. 14).

L'altro tratto caratteristico della moderna economia ambientale è, infatti, la riscoperta della dimensione etica nel discorso economico e la consapevolezza, di stampo malthusiano, « che vi sono problemi di economia politica con soluzione unicamente morale e non tecnica » (p. 55). Non è un caso, a nostro avviso, che una delle più significative opere di Daly, *For the Common Good*, sia stata scritta assieme a un teologo, Cobb, con cui Daly condivide anche la paternità nell'elaborazione dell'*indice del benessere economico sostenibile*, comprendente consumo medio, distribuzione e degrado ambientale. Tale strumento si dimostra molto utile per approssimare, in termini quantitativi, lo scarto sempre più grande fra crescita del PIL e crescita del benessere individuale. Per una divertente descrizione di un mondo immaginario, affetto da « feticismo della crescita », rinviamo al *pamphlet* di Ruffolo, *Lo sviluppo dei limiti. Dove si tratta della crescita insensata*, Laterza, Bari, 1994.

Le considerazioni, con le quali Totola Vaccari conclude il saggio, sono, a ragione, abbastanza pessimiste. L'obiettivo di una società sostenibile, che induca lo sviluppo economico verso un sentiero « che tende alla stazionarietà e ad una più equa distribuzione diacronica e sincronica delle risorse » (p. 143) non è stata finora accolta nell'agenda dei *policy-makers*. Anche nell'ultima Conferenza delle Nazioni Unite sull'ambiente e lo sviluppo, tenuta a Rio de Janeiro nel giugno 1992, sono mancate decisioni concrete e, soprattutto, con scadenze precise. È emersa, finalmente, a parere dell'autrice, un'attenzione mondiale sui temi ambientali; per la prima volta si è affrontato, in un unico contesto, il nesso tra degrazione ecologica e degrado sociale, il problema Nord-Sud e il nodo della giustizia sociale. Sono state firmate due importanti convenzioni: sulla biodiversità e sul clima.

Tuttavia l'incertezza del quadro politico internazionale non fa riporre molte speranze per il futuro. In questi periodi, è necessario che l'elaborazione culturale « non segni il passo » e vengano sviluppate nuove saggezze e approntati adeguati strumenti conoscitivi, in quello spazio di confine all'intersezione tra i saperi « consolidati ». È questo, ci sembra, il significato più profondo del testo in esame, poiché riprendendo il titolo della celebre autobiografia intellettuale di Popper, « la ricerca non ha fine ».

ACHILLE PUGGIONI

LIBRI RICEVUTI (BOOKS RECEIVED)

HOUMANIDIS Lazaros: *Humanitarian Economics. A New Perspective of Social Economics*. 1994, Athens, Synchroni Ekdotiki, pp. 326, s.i.p.

Acknowledgements. - Preface. - I. Philosophy, Sociology, Economics. – II. A Look to the Evolution of Economic Doctrines and Methods through the Prism of Individualism and Sociality. – III. The New Economics. Keynesian, New Austrian and New Classical Schools. – IV. Wages, Value, Distribution and Money. – Conclusions. – General Bibliography.

SÁRKÖZY Tamás: *The Right of Privatization in Hungary (1989-1993)*. 1994, Budapest, Akadémiai Kiadó, pp. 264, $ 35.00.

Preface. - PART ONE: WHY PRIVATIZE IN HUNGARY? – 1. The Necessity and Difficulty of Privatization in General. – 2. The Means of Privatization and Privatization by Use. – 3. On Some Debated Questions of Privatization. – PART TWO: THE COURSE OF DEVELOPMENT OF PRIVATIZATION IN HUNGARY. – 4. The Beginnings and Development of Privatization in Hungary until the Privatization Law of 1992. – 5. Assessing the 1992 Laws on the State's Entrepreneurial Property and on Privatization. – 6. Perspectives – Proposal for Acceleration. – Literature. – Political Vocabulary. – Supplement (Acts LIII, LIV and LV of 1992).

SEGRE Andrea: *La rivoluzione bianca. Processi di de-collettivizzazione agricola in Russia, Paesi Baltici, Cina, Albania: una difficile transizione dallo stato al mercato*. 1994, Bologna, Il Mulino, pp. 330, L. 40.000.

Premessa. - PARTE PRIMA: MODELLI AGRICOLI DAL 1861 A OGGI. 1. Le soluzioni al dilemma malthusiano e il modello di Stolypin. – 2. Dal modello marxista al modello sovietico. – 3. Il modello alternativo di Čajanov. – 4. Il modello agroindustriale. – 5. Verso il modello di economia di mercato. – PARTE SECONDA: PROCESSI DI DE-COLLETTIVIZZAZIONE AGRICOLA IN RUSSIA, CINA, PAESI BALTICI, ALBANIA. 6. La de-collettivizzazione agricola in Russia. – Appendice. Un modello cinese per la de-collettivizzazione agricola in Russia e negli altri paesi dell'area socialista? – 7. La via baltica. La de-collettivizzazione in Estonia, Lettonia e Lituania. – 8. Il caso albanese. – Conclusioni.

GENE

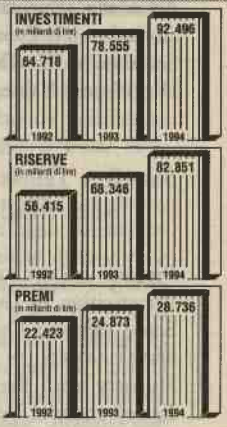
L'ASSICURATORE

L'attività del Gruppo. Il Gruppo Generali continua la politica di rafforzamento internazionale e di razionalizzazione delle strutture presenti nei diversi mercati. Con quest'ultimo obiettivo, nel 1994 è stata ridisegnata l'organizzazione operante in Germania ed è stato varato un progetto di profonda ristrutturazione delle partecipazioni detenute in Spagna tramite la Holding Central Hispano-Generali, di cui il Gruppo ha acquisito il possesso totale. Oggetto di importanti interventi di ristrutturazione e di rafforzamento è stata anche la presenza nell'area latinoamericana: in Argentina, con la costituzione tra l'altro di tre nuove società nel settore dei fondi pensione, in Perù e Colombia attraverso l'integrazione di nuove entità con le preesistenti strutture. In Italia sono state apportate allaAlleanza di Milano quattro società che hanno concorso a potenziare la sua rete distributiva e l'offerta di prodotti finanziari e assicurativi vita; è stata inoltre accentuata la specializzazione geografica, settoriale e distributiva delle compagnie danni. Due nuove controllate sono state costituite in Lussemburgo e nella Repubblica Ceca. La principale operazione di acquisizione ha riguardato la partecipazione di controllo nella Fortuna, una holding di Zurigo cui fanno capo cinque compagnie di assicurazione, grazie alla quale viene considerevolmente migliorata – sia in termini di copertura del territorio che di gamma di prodotti – la presenza sul mercato elvetico.

Nel giugno 1995 è stata infine messa a punto una complessa operazione che ha dato avvio alla riorganizzazione del Gruppo in Francia e all'acquisizione di due compagnie, la France Vie e la France IARD.

I DATI DEL BILANCIO CONSOLIDATO 1994

ATTIVO (in milioni di lire)	1994	1993
Beni immobili	11.917.289	10.445.896
Titoli a reddito fisso	56.436.372	48.282.042
Azioni e partecipazioni	12.996.738	10.559.561
Prestiti	6.219.311	4.470.835
Depositi di riassicurazione	808.006	711.164
Depositi bancari	4.117.942	4.085.556
Debitori diversi e altri attivi	10.875.595	9.215.736
Totale attivo	**103.371.253**	**87.770.790**
PASSIVO (in milioni di lire)		
Accantonamenti per impegni assicurativi	82.851.209	68.345.834
Depositi di riassicurazione	413.768	817.840
Altri passivi	7.934.346	7.280.410
Quote di terzi	2.553.706	2.377.046
Patrimonio netto	8.977.352	8.339.515
Utile dell'esercizio	**640.872**	**610.145**
Totale passivo	**103.371.253**	**87.770.790**



■ I premi lordi hanno raggiunto 28.736,2 miliardi (+15,5%) di cui 12.593,7 nel ramo vita (+26,1%) e 16.142,5 nei rami danni (+8,4%). Essi provengono per il 75,6% da Paesi dell'Unione Europea (Italia 29,6%) per il 17,7% dagli altri Paesi europei e per il restante 6,7% dai Paesi extraeuropei.

■ Per prestazioni assicurative sono stati effettuati pagamenti per 14.674,1 miliardi.

■ Gli accantonamenti per impegni assicurativi sono aumentati di 10.162,3 miliardi.

■ I costi di produzione e amministrazione hanno inciso per 6.618,2 miliardi (+10,2%).

■ Il totale degli investimenti è di 92.495,7 miliardi a fronte dei quali vi sono accantonamenti per impegni assicurativi per 82.851,2 miliardi.

■ I redditi degli investimenti sono risultati di 6.920,4 miliardi (+9,4%).

■ La valutazione del portafoglio titoli ai corsi di borsa di fine anno ha fatto emergere minusvalenze di registro per 660,7 miliardi, che sono state spesate nel conto economico.

■ Il patrimonio netto complessivo risulta di 11.298,5 miliardi, di cui 8.977,3 miliardi di pertinenza della Capogruppo.

■ Sono state consolidate 93 compagnie di assicurazione operanti in una quarantina di mercati, 35 finanziarie, 22 immobiliari e 3 agricole.

■ L'utile complessivo dell'esercizio è stato di 873,4 miliardi, a fronte di 686,1 miliardi dell'anno precedente. La quota dell'utile consolidato di pertinenza della Capogruppo è di 640,9 miliardi contro i 610,1 miliardi dell'esercizio precedente.

Il Gruppo Generali, oltre che in Italia, opera in Argentina, Austria, Belgio, Brasile, Canada, Colombia, Danimarca, Ecuador, Emirati Arabi, Francia, Germania, Giappone, Gibilterra, Gran Bretagna, Grecia, Guatemala, Guernsey, Hong Kong, Irlanda, Israele, Libano, Lussemburgo, Malta, Messico, Olanda, Panama, Perù, Portogallo, Principato di Monaco, Repubblica Ceca, Romania, San Marino, Singapore, Spagna, Stati Uniti, Sud Africa, Svizzera, Turchia, Ungheria.

RALI

NZA FRONTIERE.

L'attività della Capogruppo. L'impegno primario della Compagnia è rivolto al consolidamento del riequilibrio dei risultati industriali, con il duplice obiettivo di una costante e ordinata crescita della redditività complessiva e del rafforzamento patrimoniale. L'esercizio 1994 è stato caratterizzato da un andamento positivo, determinato dal forte miglioramento del risultato della gestione strettamente assicurativa: in quest'ambito il lavoro diretto italiano dei rami danni – che in passato aveva prodotto perdite molto pesanti – è stato nuovamente ricondotto all'equilibrio, grazie alla concomitante riduzione della sinistralità e dell'incidenza dei costi; anche il lavoro estero e l'indiretto hanno evidenziato significativi e diffusi miglioramenti. Il più favorevole andamento della gestione industriale ha influito positivamente sul risultato della gestione ordinaria che ha evidenziato un utile notevolmente più elevato di quello dell'esercizio 1993, malgrado la stasi dei redditi degli investimenti, determinata dall'andamento dei tassi di interesse sui mercati mondiali. La gestione straordinaria ha registrato nel 1994 una flessione dei profitti realizzati da alienazioni di titoli e immobili, sia a seguito del minor apporto derivante da operazioni di carattere eccezionale sia in funzione dell'evoluzione dei mercati mobiliari che ha condizionato l'attività di trading. Il conto economico ha da un lato registrato minusvalenze di registro sul portafoglio titoli per 256,9 miliardi e dall'altro ha beneficiato di un saldo positivo di 174,8 miliardi delle variazioni delle parità di cambio, tenuto conto dell'elevata incidenza delle attività estere. L'utile netto di bilancio, dopo il pagamento di imposte per quasi 200 miliardi, è salito da 420,4 a 440,9 miliardi.

IL BILANCIO 1994 DELLA CASA MADRE

(in milioni di lire)	1994	1993
Premi lordi	10.251.002	9.776.397
Premi ceduti	– 950.445	– 1.224.888
Premi netti	9.300.557	8.551.509
Redditi netti degli investimenti	2.509.804	2.481.619
Interessi tecnici gestione vita	– 1.509.726	– 1.498.016
Risultato della gestione tecnica	– 420.924	– 682.407
Proventi e oneri vari	– 111.575	– 127.715
Saldo della gestione ordinaria	**467.579**	**173.481**
Profitti da alienazione di titoli ed immobili	260.224	512.713
Utili di cambio	179.729	208.977
Minusvalenze da valutazione di titoli	– 254.648	– 185.384
Imposte indirette non ricorrenti e imposte pagate all'estero	– 14.539	– 135.571
Saldo della gestione straordinaria	**170.766**	**400.735**
Imposte sul reddito dell'esercizio	– 197.446	– 153.846
Utile dell'esercizio	**440.899**	**420.370**

■ L'utile netto d'esercizio è di 440,9 miliardi, contro 420,4 miliardi dell'esercizio precedente.

■ I premi lordi hanno raggiunto i 10.251 miliardi (+4,9%), di cui 4.200,9 miliardi nel ramo vita e 6.050,1 miliardi nei rami danni.

■ Per prestazioni assicurative sono stati effettuati pagamenti per 5.285,6 miliardi.

■ Gli accantonamenti per impegni assicurativi sono aumentati di 3.844,7 miliardi.

■ I costi di produzione e di amministrazione hanno inciso per 2.313,5 miliardi. L'incidenza dei costi sui premi è diminuita nel lavoro diretto italiano dal 23% del 1993 al 22,4%.

■ Gli investimenti ammontano a 34.211,3 miliardi (+11,5%) a fronte dei quali vi sono impegni assicurativi per 27.978,9 miliardi.

■ I redditi degli investimenti sono stati pari a 2.509,8 miliardi (+2,5% a termini omogenei).

■ Il patrimonio netto raggiunge i 6.708,9 miliardi con un incremento di 141,1 miliardi. L'eccedenza rispetto al fabbisogno minimo del margine di solvibilità è di 2.136,3 miliardi nel ramo vita e di 2.261,8 miliardi nei rami danni.

■ Il dividendo – al lordo delle ritenute di legge – è di 360 lire per azione (+10% a termini omogenei) ed è pagabile dal 17 luglio.

■ Il Consiglio di Amministrazione, riunitosi a conclusione dei lavori assembleari, ha nominato Presidente Antoine Bernheim, Vicepresidenti Francesco Cingano e Gianfranco Gutty, Amministratore Delegato Gianfranco Gutty.

Compagnie del Gruppo Generali in Italia: AdriaVita, Agricoltura, Alleanza, AssiBa, Aurora, La Carnica, La Venezia, Navale, SIAD, Trieste e Venezia, Risparmio Assicurazioni, Risparmio Vita, UMS Generali Marine, Europ Assistance.

GRUPPO GENERALI

L'ASSICURATORE SENZA FRONTIERE.

ALLEANZA ASSICURAZIONI

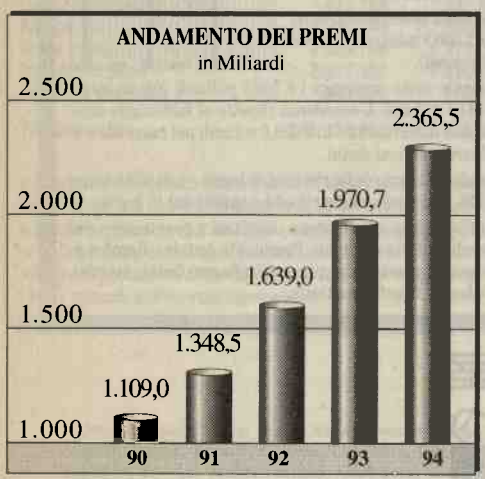
Società per Azioni con Sede e Direzione Generale in Milano - Viale L. Sturzo, 35
Capitale Sociale L. 330.135.513.000 interamente versato - Registro Imprese Milano N° 60220

BILANCIO 1994

ENTRATE	(miliardi di lire)
Premi e accessori	2.365,5
Premi ceduti in riassicurazione	(-) 927,0
Redditi ordinari e profitti da alienazione	1.271,9
Saldo prelievi - accantonamenti	67,8
Altre partite tecniche	31,0
Altri proventi	101,3
TOTALE	**2.910,5**

USCITE	
Sinistri, scadenze, riscatti	293,8*
Incrementi riserve tecniche	1.135,3*
Redditi verso riassicuratori	337,9
Costi di produzione e amministrazione	215,0*
Minusvalenze da titoli	453,0
Altri oneri	127,8
Imposte e tasse	165,3
Utile dell'esercizio	**182,4**
TOTALE	**2.910,5**

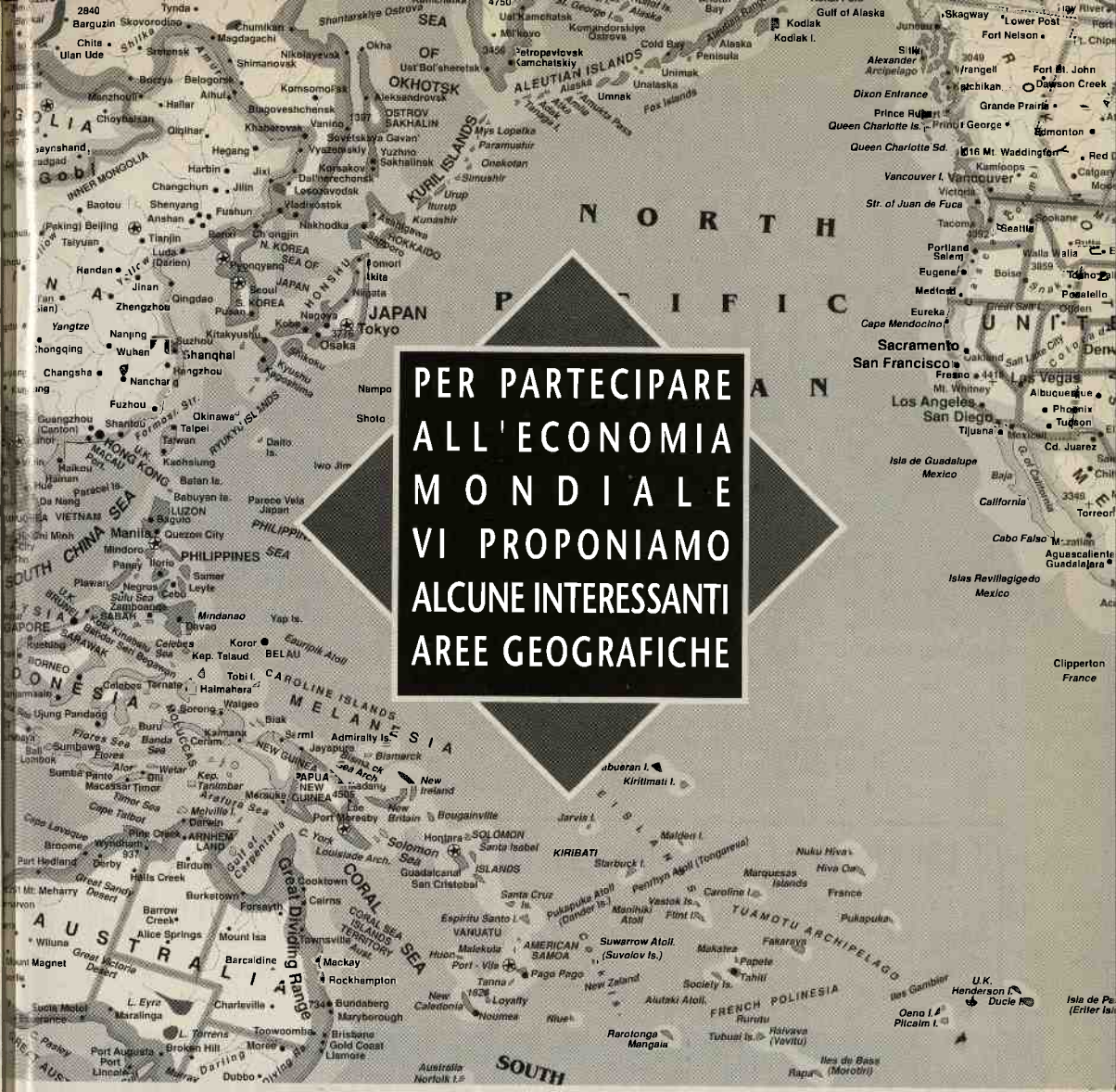
* *al netto quote cedute ai riassicuratori*



PARTE ORDINARIA

- I premi ed accessori sono ammontati a 2.365,5 miliardi (1.970,7 miliardi nel 1993), con un incremento pari al 20%. Sono stati ceduti in riassicurazione 927 miliardi, pari al 39,2%.
- La produzione netta in capitali è stata di 9.400 miliardi (8.562), con un aumento del 9,8%, mentre i premi annui di nuova produzione sono ammontati a 582 miliardi (485), con un incremento del 20%.
- I redditi e profitti da alienazione sono ammontati a 1.271,9 miliardi (1.292,9) e sono stati destinati per il 27% al servizio riassicurazione, per il 33% alle riserve tecniche e per il 40% a favore del conto economico. Rendimento Fondo S. Giorgio: 11,65%, retrocessione agli Assicurati 80%.
- Gli investimenti ammontano a 11.376 miliardi (9.680 nel 1993), ripartiti come segue: obbligazioni 58,8%, immobili 18%, partecipazioni 13,1%, altri 10,1%. Il rendimento medio è del 9,4%.
- I sinistri, le scadenze e i riscatti sono stati di 606 miliardi, di cui 293,8 a carico della Società e 312,2 a carico dei riassicuratori.
- È stato completato il progetto imprenditoriale approvato nel 1993 con l'acquisizione del residuo 49% del capitale de' La Venezia S.p.A. e Fincral S.p.A.
- L'utile è stato di L. 182,4 miliardi. È stato deciso un dividendo unitario invariato di L. 135 sulle azioni ordinarie e di L. 160 sulle azioni di risparmio n.c., pagabili dal 18 luglio 1995.
  La Riserva Patrimoniale è stata rafforzata di 67 miliardi, raggiungendo 463,4 miliardi.
  L'utile per azione (ordinarie e di risparmio n.c.) è di L. 277,8 e il rapporto dividendo/utile è del 50%.
- Cariche Sociali: Presidente Amm. Del. A. Desiata, Vice Pres. E. Coppola Di Canzano.
  Amministratori: G. Bazoli, E. Braggiotti, G. Buoro, M. Casella, O. Castellino, E. Dusi, G. Gutty, P. Iona, G. Liveris, A. Minucci, A. Wormser.
  Collegio Sindacale: Pres. F. Viezzoli.
  Membri effettivi: G. Spizzico, G. Terrin.
  Membri supplenti: G. Dassi, N. Dolfin.
- Il Bilancio Consolidato ha chiuso l'esercizio 1994 con premi lordi per 2.542,7 miliardi (+ 29,5%), investimenti per 11.852,9 (+ 22,1%) e un saldo utile di 140,6 miliardi.

ALLEANZA ASSICURAZIONI
assicura e semplifica la vita



Se per i vostri risparmi cercate nuove forme di investimento, GenerComit vi propone oggi due interessanti opportunità: investire sui nuovi mercati con due fondi a respiro internazionale.

GENERCOMIT PACIFICO un fondo azionario caratterizzato da un prevalente interesse per titoli di emittenti esteri appartenenti a Paesi dell'area del Pacifico.

GENERCOMIT ESPANSIONE un fondo bilanciato, caratterizzato da prevalente interesse per titoli di emittenti esteri con una particolare attenzione ai Paesi cosiddetti emergenti dell'America Latina, dell'Asia e dell'Europa dell'Est.

Parlatene subito con i Promotori Finanziari GenerComit Distribuzione SIM, oppure chiedete informazioni agli sportelli della Banca Commerciale Italiana, del Banco di Chiavari e della Riviera Ligure e della Banca di Legnano.

Affidatevi alla professionalità di GenerComit Gestione, la società di fondi di investimento di due grandi partners: La Banca Commerciale Italiana e le Assicurazioni Generali.

GenerComit

Con l'obiettivo di dare valore al risparmio

E' una iniziativa BANCA COMMERCIALE ITALIANA

GENERALI Assicurazioni Generali S.p.A.

Avvertenze. Prima dell'adesione, leggere il prospetto informativo che il proponente l'investimento deve consegnare.

Studi economici e sociali

Rivista di vita economica - Centro Studi "G. Toniolo"

Anno XXX **Gennaio - Marzo 1995** **Fasc. I**

SOMMARIO

Direzione, Redazione e Amministrazione
Studi Economici e Sociali, Piazza G. Toniolo, 2 - Pisa

Il Pensiero Economico Moderno

Anno XV **Gennaio - Giugno 1995** **N. 1-2**

SOMMARIO

Direzione, Redazione e Amministrazione
Il Pensiero Economico Moderno, Via della Fortezza, 1 - Pisa

Con le nuove esclusive coperture assicurative!

Investe, assiste, finanzia, assicura.

L'energia nei risparmi.

L'efficienza nei servizi.

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1ª Posizione

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2ª Posizione

2ª Posizione

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3ª Posizione

3ª Posizione

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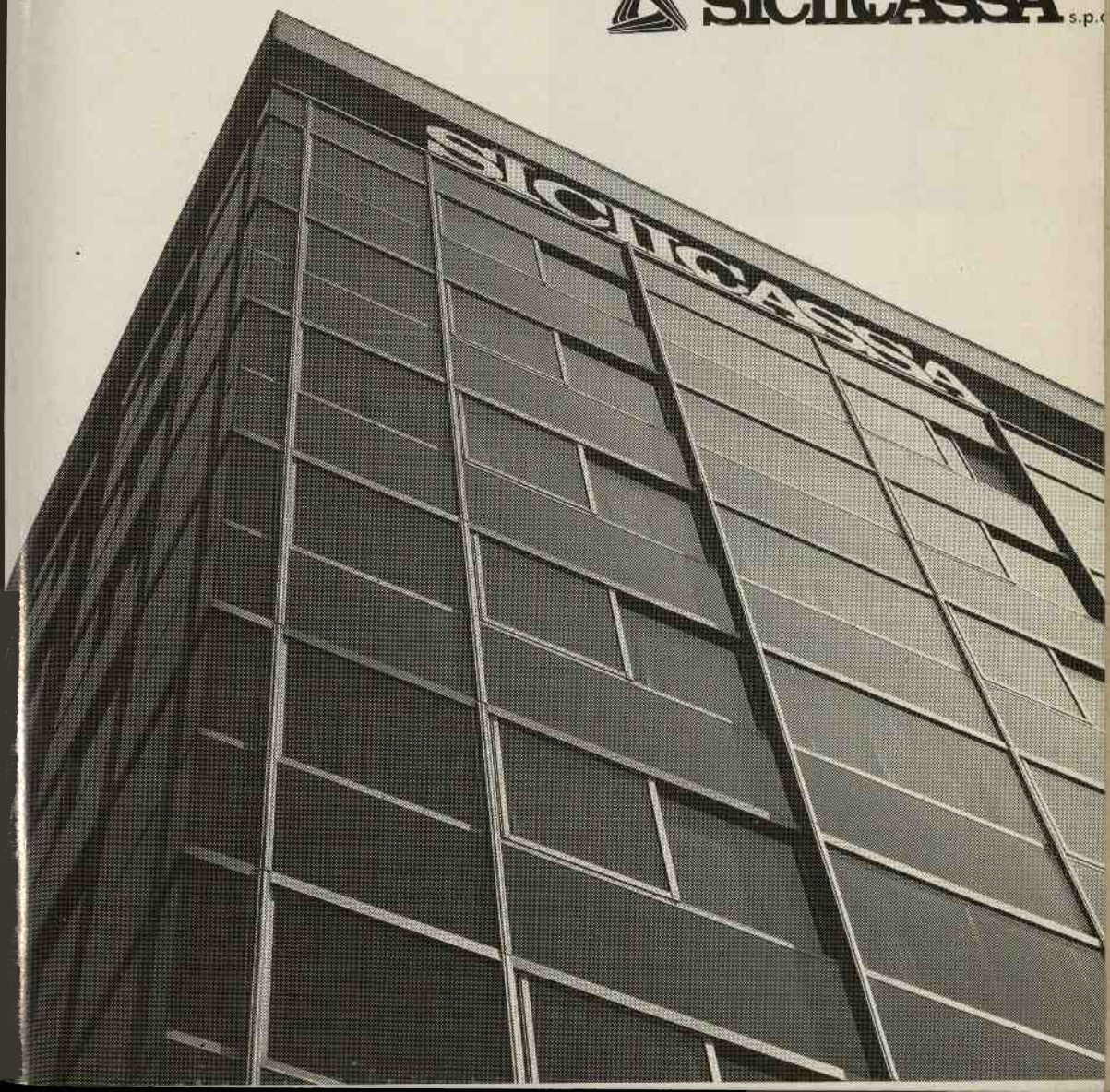

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